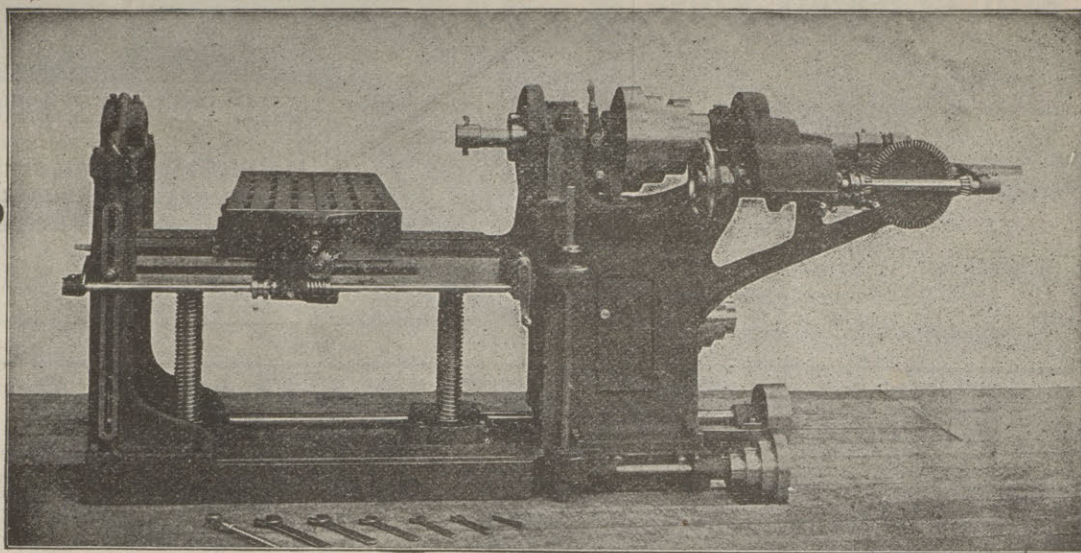


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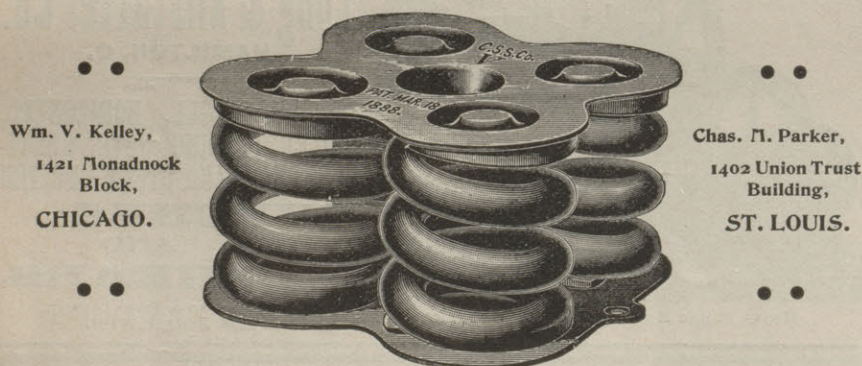
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|--|--|
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Heavy Forge Lathes.
Driving-wheel Lathes.
Lathes for turning steel-tired car-wheels.
Lathes for turning printing-press cylinders.
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Planing Machines for frogs and split-switches.
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Slotting Machines for locomotive-frames.
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Boring and Turning Mills for steel tires.
Boring and Turning Mills with extensible housings.
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Double Cutting-off and Centering Machines.
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Plate-bending Rolls for ship plates.
Vertical Bending Rolls for armor plates.
Plate-straightening Machines.
Shaft-straightening Machines.
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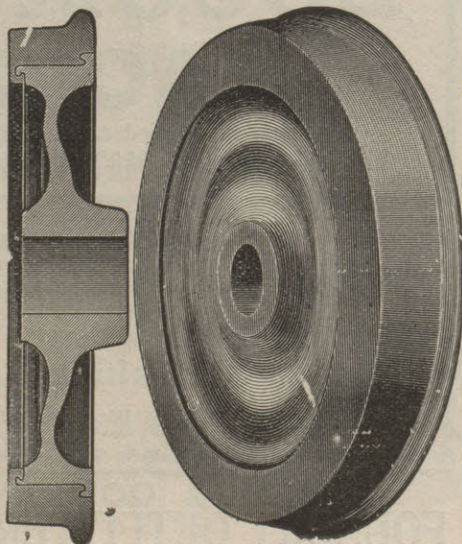
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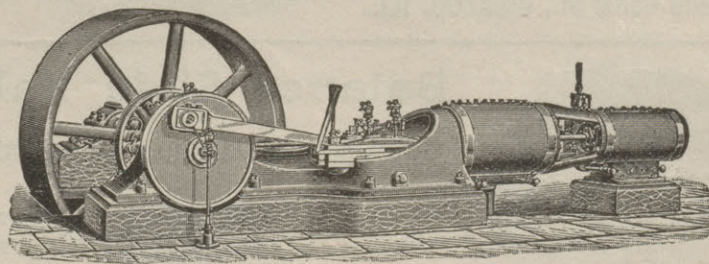
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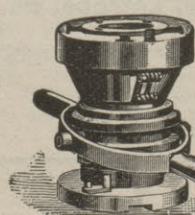
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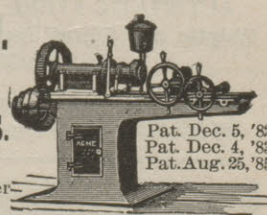


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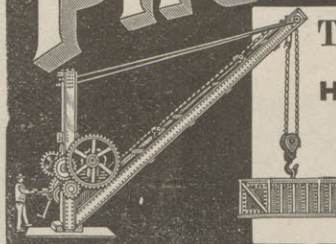


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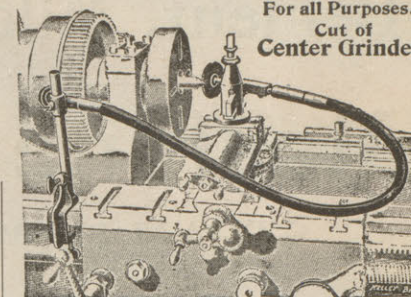
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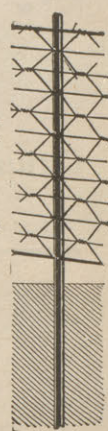
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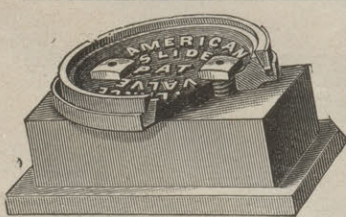
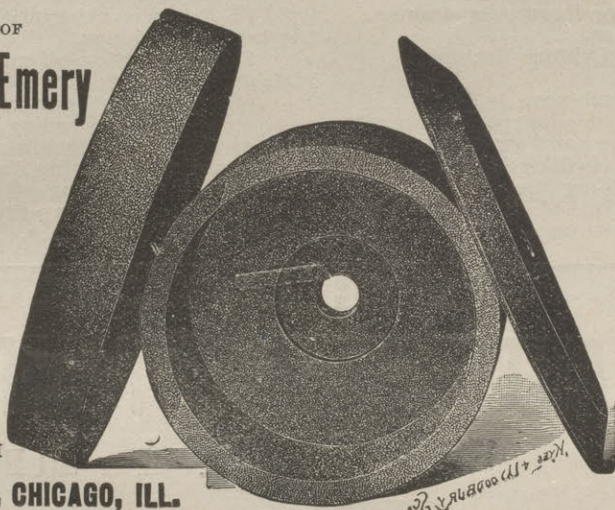
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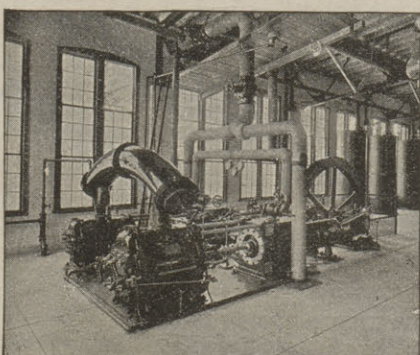
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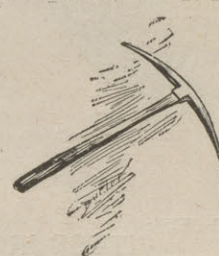
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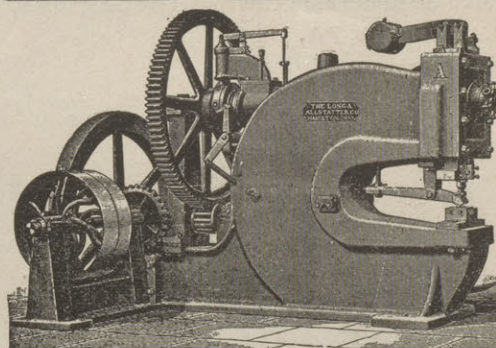
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THE RAILWAY REVIEW

No. 41

OCTOBER 10, 1896.

XXXV.

AN HISTORIC BRIDGE.—The bridge across the Susquehanna river at Columbia, which was almost entirely destroyed by the cyclone of September 29, has figured somewhat in history. It was originally constructed in 1814, under an act of the legislature approved by the governor March 28, 1809. The original corporation was known as the Columbia Bank & Bridge Company, changed later to the Columbia Bridge Company, out of which grew the present Columbia National Bank. About one-half of the bridge was destroyed by an ice freshet in 1832 but was completely repaired in 1834. When Lee was advancing northward into Pennsylvania the entire structure was destroyed by fire June 30, 1863, by orders of General Couch as a military necessity. It was rebuilt in 1869 and purchased by the Pennsylvania Railroad Company under the provisions of the act of March 8, 1871. The bridge was 1 11-100 miles in length, and consisted of 29 spans, two in the center being of iron—to prevent the spread of fire to the entire structure, should such occur at either end. The remaining spans were of wood of the ordinary arched Howe truss form, covered on the sides and top. There was but one track used by the trains of the Frederick division of the Pennsylvania Railroad. The entire floor space was planked for the accommodation of vehicles and foot passengers. The bridge has frequently been badly damaged by ice floods, and great anxiety is occasioned every spring for its safety. Few, if any, entertained the thought that it would meet the fate it has.—[Railway World.]

INCREASING USE OF THE "BOGIE" TRUCK IN ENGLAND.—The use of a leading four-wheeled truck under express locomotives is gaining favor in England and on the continent, some believing it the safer construction, while others not admitting the need of it, use it for the reason that they find the engineers make better time because of their confidence in it. The report on the accident which occurred last May on the North British Railway also contains an argument in favor of the leading four wheeled truck. The accident was caused by the expansion and consequent lateral deflection of the rails by the excessive heat of the sun at that time. Lieutenant-Colonel York, reporting to the Board of Trade, says: "The fact that the engine did not leave the rails, although the rest of the train did, may probably be attributed to the flexibility imparted to the engine by the leading bogie, which was able to adjust itself to the irregular curvature of the lines produced by the expansion of the rails, whereas the tender, with its six wheels and rigid wheelbase, was most probably the first vehicle to leave the metals and dragged the rest of the train after it."—[American Engineer and Car Builder.]

HARDENING STEEL.—Mr. W. F. Durfee, C. E., who recently delivered a lecture before the Franklin Institute, is of the opinion that in this matter of hardening steel, the value of the "personal equation" of the workman is very important. It is not uncommon to find a practical mechanic who usually has good success in the use of a certain kind of steel with which his neighbors, equally skillful perhaps in other matters, can do nothing. So often has he encountered this fact, that he is inclined to believe that if a person in pursuit of information as to the proper qualities of steel to use for any given article should travel through this land and obtain the honest opinions of all who were making the article in question, "the last state of that man would be worse than the first;" for the chances are that every person consulted would have an opinion differing from those of his fellow craftsmen; and, although when our traveler started on his search for technical wisdom he was positive that he knew nothing, he could not rejoice in even that negative certainty when he returned. In the present state of our knowledge, there is no recognized uniform, scientific method of hardening and tempering steel; all we have is a tentative art, as crude in its development as it is obscure in its origin."

SPECIALIZATION IN PROFESSIONAL PURSUITS.—Specialization in professional pursuits, in engineering particularly, has become the natural and proper result of the growth of applied science. The civil engineer of past generations who was supposed to command a comprehensive knowledge of every branch of engineering then practiced, from the design of a steam engine or machine tool to that of a bridge, or city drainage system, or complete water works plant, has virtually ceased to exist, and in his stead we find the steam engineer, the sanitary engineer, the bridge engineer, and the engineer of various other subdivisions of the great field of engineering, each an expert in his particular line. It has been found impossible for one man to combine within himself the detail knowledge necessary to practice all these branches with entire success. One branch alone is almost sufficient to make a life study, and the engineering specialist of to-day finds himself busily enough occupied in keeping abreast of the times.—[Cassiers.]

TECTORIUM AS A SUBSTITUTE FOR STAINED GLASS.—According to a consular report tectorium, which is being experimented with in Europe, consists of a galvanized iron web covered with a gelatinous substance, and is translucent

but not transparent. It is described by a manufacturer as a substance that (1) can be bent without being broken, (2) is both tough and flexible, (3) is not softened by the rays of the sun, (4) is non-soluble, (5) is not affected by severe cold, (6) is a bad conductor of heat, (7) is well adapted for roofs on account of its extreme lightness, (8) when exposed to the sun it loses its original yellowish color in time and becomes harder and more durable, (9) can be made by a very cheap process to imitate stained glass in such a manner that it cannot be distinguished from the genuine article, (10) can be cut by shears, nailed to wood, and transported without danger, (11) can be easily repaired in case it is cut, (12) does not break, and (13) is well adapted for factory windows and skylights for hot houses, market halls, verandas, transportable buildings and for roofing. It is stated that it is sold in small quantities in a few places, but that it is not known to the general public, and as a commercial product is still an experiment.

TRAFFIC VIA THE "SOO" CANAL.—Comparative statement of commerce east and west bound through St. Mary's Falls canal, Michigan, for month of August, 1896:

EAST BOUND.				
Items.	Designation.	U. S. Canal	Can. Canal	Total.
Copper.....	Net tons.....	15,722	1,039	16,761
Grain.....	Bushels.....	2,793,185	385,035	3,178,220
Building stone.....	Net tons.....	3,606	.....	3,606
Flour.....	Barrels.....	1,075,841	181,520	1,257,361
Iron ore.....	Net tons.....	756,790	228,875	985,665
Iron, pig.....	Net tons.....	342	1,100	1,442
Lumber.....	M. ft. B. M.....	84,858	6,690	91,548
Silver ore.....	Net tons.....	100	.....	100
Wheat.....	Bushels.....	7,412,945	2,407,695	9,820,640
Unclashed frt.....	Net tons.....	12,521	3,472	15,993
Passengers.....	Number.....	1,390	603	1,993

WEST BOUND.				
Items.	Designation.	U. S. Canal	Can. Canal	Total.
Coal (hard).....	Net tons.....	51,527	21,167	72,694
Coal (soft).....	Net tons.....	217,308	101,361	318,669
Flour.....	Barrels.....	75	.....	75
Grain.....	Bushels.....	1,100	.....	1,100
Manuf'd iron.....	Net tons.....	12,090	8	12,098
Salt.....	Barrels.....	41,326	.....	41,326
Unclashed frt.....	Net tons.....	30,888	8,834	39,722
Passengers.....	Number.....	1,448	415	1,863

East bound freight, net tons.....1,667,210
West bound freight, net tons.....447,272

Total.....2,114,482
Total craft—United States.....1,628
Total craft—Canadian.....597

Total registered tonnage—United States.....1,728,188
Total registered tonnage—Canadian.....438,489

2,166,677

THE LARGEST CORPORATION.—In England the general impression prevails that the London & North Western Railroad is the largest corporation in the world, apropos of this I ran across a comparison of this road with the Pennsylvania, which may be of interest and which shows conclusively that the American company is far ahead of its English rival. The London & North Western's capital is \$595,000,000, it has a revenue of \$6,500 an hour, 2,300 engines and 60,000 employees, and repairs that cost \$130,000 a month. The Pennsylvania has a capital of \$857,075,600 and 15,430 miles of track, which traverse 13 states. It has 3,756 locomotives, which consume 20,000 tons of coal a day and make runs equal to the distance around the globe every two hours. It has a total of 158,524 cars. The North Western boasts of 60,000 employees, but the Pennsylvania Company has over 100,000 men who with their families make up a total of about 500,000 persons dependent for living upon the \$60,000,000 it distributes in wages every year. In 1895 the Pennsylvania Company owned 5 per cent of all the railway mileage in the United States. It carried 11 per cent of all the passengers who traveled by rail in the year 1895, and its earnings were 11 2-5 per cent of all the earnings of all the roads in the country. Like the great North Western the Pennsylvania makes almost everything it uses, and with its plants could build a locomotive every day in the year if it chose to do so.

THE FASTEST TRAIN IN GERMANY.—The best train service in Germany is that between Berlin and Hamburg, the most important seaport in the empire. The track between the two towns is favorable for fast running, being without curvature of a serious nature and having very easy gradients. The rolling stock is also of the best description and many of the trains are vestibuled from end to end. The complete service between the Lehrter station at Berlin and the Klosterthor station at Hamburg comprises the following trains attaining or exceeding an inclusive speed of 40 miles an hour.

Berlin to Hamburg, 177 1/2 miles			Hamburg to Berlin.		
Depart.	Arrive.	Time on Journey.	Depart.	Arrive.	Time on Journey.
6:30 a. m.	10:36	3 hrs. 26 m.	9:0 a. m.	12:55	3 hrs. 55 m.
9:00 a. m.	1:14	4 hrs. 4 m.	12:55 p. m.	4:33	3 hrs. 38 m.
12:50 p. m.	4:26	3 hrs. 36 m.	4:50 p. m.	8:40	3 hrs. 50 m.
7:20 p. m.	10:56	3 hrs. 36 m.	8:20 p. m.	11:58	3 hrs. 38 m.

The train tested was the 12:50 p. m. from Berlin, and the subjoined table gives details of the running. Curiously enough, although the speed for the whole distance works out at 51 1/2 miles an hour, yet, so even was the running, that a speed of 60 miles per hour was only exceeded for about

three kilometres in the whole run. The pace was a steady 55 miles an hour nearly all the way when clear of stopping stations.

Berlin to Wittenberge.....126.9 km. in 92 min. } 286.3 km.
Wittenberge to Friedrichsruh } 133.1 km. in 95 min. } or 177 1/2 m.
Friedrichsruh to Hamburg.....26.3 km. in 20 min. } in 207 min

Engine No. 485 (Altoona Administration) drew the train as far as Wittenberge, and the engine No. 462, thence to the end of the trip. These engines have four coupled bogies, and drivers about 6 1/2 ft. in diameter, four coupled. The load consisted of four corridor eight-wheel bogie carriages and a six-wheel van, a total of 133 tons. The train ran slowly through Spandau and over the draw-bridge at that place, also through the suburbs of Hamburg.—[Railroad Gazette.]

EVAPORATIVE POWERS OF COKE AND COAL.—According to a German writer the directors of the gas and water works of the town of Colmar made experiments on the boiler at the pumping station as to the relative cost of coke and coal fuel. The trials of the two fuels were made under exactly the same circumstances. Coke was used during the first week of the experiment, and coal the following week. On Monday a short preliminary trial was made; on Tuesday a trial was made after the boiler had reached its normal working condition, the trial finishing under as nearly as possible the same conditions. On each of the three following days 24-hour trials were made, so that the influence of the cooling-down and heating-up losses were manifest. Finally, on Saturday another trial similar to that on Tuesday was made. Besides observations on the fuel consumed and steam produced, temperature observations and gas analyses were made. Also a daily average sample of the fuel used was taken and its calorific values determined. The calorific values of the coke and coal were in the ratio 1 to 0.8933. The cost of coke fuel was 0.9213 times that of coal for the same amount of steam generated, showing in this case an economy of 7.87 per cent in favor of coke.

SIAM'S NEW RAILWAY.—A correspondent in the London Times says that with exception of the short narrow gauge line to Paknam, the railway now under construction from Bangkok to Khorat is the only railway in Siam. It is to be the first of a vast ramification of lines designed to distribute civilization to the most distant portions of the kingdom. That the construction of the railway to Khorat should be persisted in is a matter of the highest importance to Siam. No hopes are held that the railway will pay, as a commercial speculation, but hopes are entertained that, in the awakening of Siam, that fatal unsteadiness of purpose which has characterized her actions in the past may give way under better guidance to some continuity of action, and the railway, having been begun, may be finished. There is no physical reason why the railway should not be completed, and when the first engine steams into Khorat, Siam will have made her best effort so far to escape from the state of semi-barbarism in which she is enthralled. The railway is 163 miles in length, and, as is well known, it is being built by Mr. Murray Campbell, one of the distinguished pioneer railway contractors of Asia, and financed by Messrs. Matheson & Co., of Lombard street. It is designed to pierce the "center of a vast plain of magnificent soil reaching right away to the Mekong, and capable, if properly developed, of nearly doubling the present revenues of Siam." The railway is an "extremely cheap full gage line." It was to have been finished on December 12, 1895. An extension of time of one year has already been granted, and a second extension may reasonably be expected. That the railway can be ready for traffic by December, 1897, there is no doubt, but the most difficult section of the whole line will, barring accidents, certainly be completed before the end of the current year. There have been many difficulties to contend with—a spongy soil, and the alluvial plain fever and sickness in the jungle; too much water at one season, a dearth of it at another; no roads; difficulty of transport, untrained laborers, a vacillating government, and many others. The director general of the Siamese Railways is an able German engineer, Herr Bethge, who was formerly Krupp's agent in China. He was an unsuccessful tenderer for the construction of the line, the making of which he is now superintending. Inevitable friction has resulted from this opposition of interests. Constant questions are arising as to whether, for example, the subsidence of an earth-work or the wobbling of a masonry embankment is due to faults of construction or of design. Siam is a country rejoicing in a multiplicity of advisors, culled from half the nations of Europe. In the multitude of counsel, they say, there is much wisdom.

THE NEW ORLEANS ELEVATOR.—The new Illinois Central elevator in New Orleans is about finished, save for the several days work necessary to complete the conveyors reaching out to the river. These conveyors are being rapidly placed in shape, and when once finished the discharge and loading of grain will get started. This new elevator at Stuyvesant docks is a much more complete affair than most people suppose. As a matter of fact, it is reckoned by elevator experts as being the most complete of the kind in the south. It will have the capacity of unloading 300 cars every ten hours, while its capacity for loading into boats from elevators will be much greater. The new wharves are also nearing completion. Between the immense bulkhead and the levee proper a great deal of work has been done in the way of filling up the space with dirt. Over 200 car loads of dirt and gravel have been going into this place every day for the past ten weeks. It is all leveled off now, however, and plank in being put upon the wharves, so that the picture is presented of a long stretch of level wharfage, the envy of railroads without such facility.

METALLIC FREIGHT CAR TRUCK.

The accompanying illustrations show the details of construction of a metallic freight car truck which possesses some remarkably good points and is somewhat of a departure from the lines upon which most designers are working, in that the form is the same as the old style of diamond rigid bolster truck. In these illustrations Figs. 1 and 2 show end views of the truck, Fig. 3 shows a side elevation and Fig. 4 a cross-section. The important feature of the truck is the bolster which is built up of malleable iron and steel plates. There are six pieces of malleable iron, two in the center and two at each end of the bolster. The castings butt against each other along the top flange and are riveted through that member to a steel

the spring plank. By reference to Fig. 2 the large amount of clearance will be observed and this is sufficient to allow the truck to pass over a draw-bar head without striking it. This desirable feature is accomplished by making the brake beam of the form shown in Fig. 5. The compression member of this beam consists of a wrought iron bar 2 in. by 1 in. which is upset on the ends for giving a good sized seat for the brake head. The upset portion of the ends is grooved out to receive the tension member which is a 1 in. rod. This rod passes through the brake head and by means of two nuts on the outside ends holds the members in place. This gives a beam which is extremely simple in form and makes the distance from the face of the shoe to the back of the head so small that there is ample room for the beam

The manner of hanging the brake beams is worthy of more than passing notice as it is very good. The customary plan is to hang them from the bolster and when this is done the shoes are raised and lowered on the wheels as the springs are compressed or released by variation in the load, or jars and jolts from irregularities in the track. In this truck the beams are hung from the top of the arch bars by means of a malleable casting of the form shown in Fig. 6. This casting is held in place by the column bolts and the hangers are supported by the lugs shown in illustration. By this arrangement the brake beams always keep the same relation to the wheels regardless of the load or movements of the car body and bolster. The truck is constructed entirely of malleable iron and steel, the only cast iron being that used in the

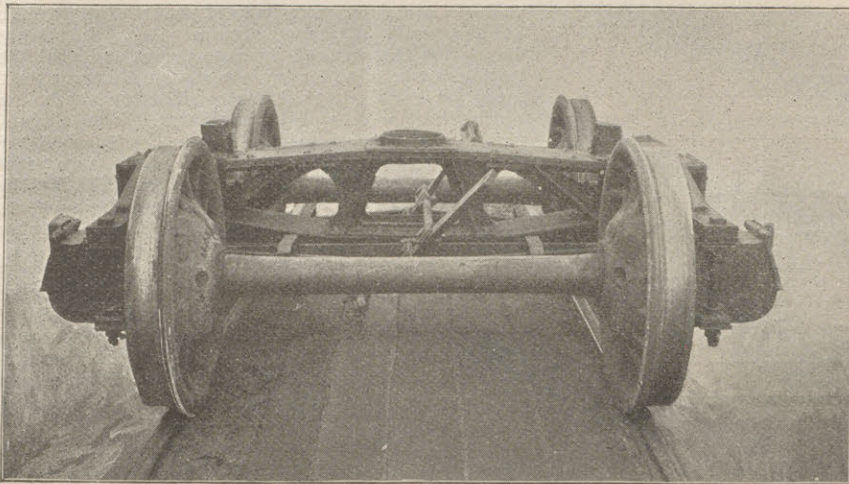


FIG. 1.—END VIEW OF TRUCK.

plate 11 in. wide and $\frac{3}{4}$ of an inch thick. This combination of malleable iron and steel receives all compression strains and the tension strains are transmitted to a steel plate 11 in. wide and $\frac{1}{2}$ an inch thick which is riveted to the bottom flanges of the castings.

It will be noted from Fig. 4 that the castings are so formed as to receive all compression strains and

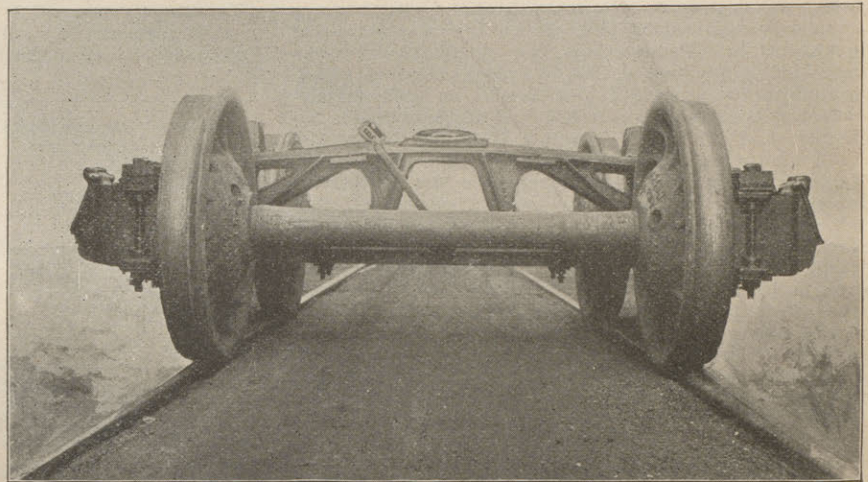


FIG. 2.—SHOWING CLEARANCE UNDER TRUCK.

between the bolster and the wheels. The spring plank as may be seen in Fig. 3 consists of a channel iron the dimensions of which are $13 \times 4 \times \frac{1}{2}$ in. The safety hangers are riveted directly to the spring plank and are made of flat iron as shown in Figs. 1 and 4. These hangers serve as supports for keeping the beams at a proper level and obviate the necessity for a third support.

journal boxes. The manufacturers make their own malleable iron and are therefore assured of its being of the best quality.

It is generally supposed that the weakest portion of a truck is the bolster, but in this design this is one of the strongest, if not the strongest part, as has been proven by tests. A test was made of the bolster by placing it on solid supports 6 ft. 3 in. between

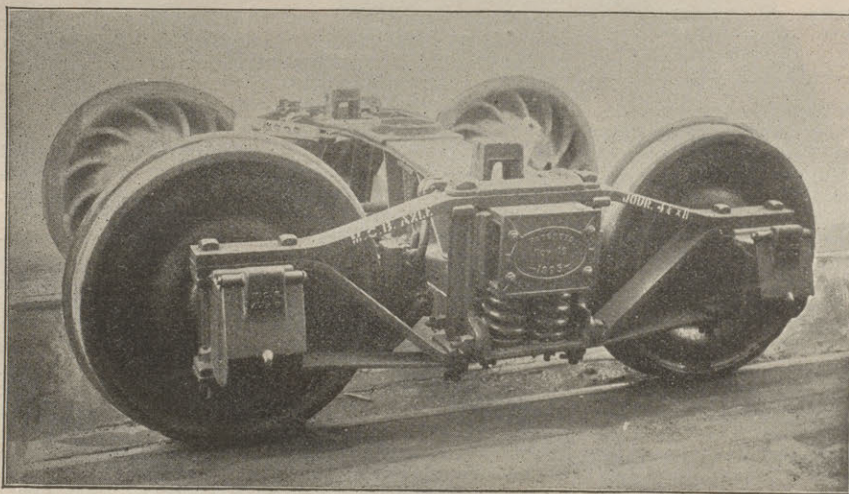


FIG. 3.—SIDE ELEVATION.

transmit them directly to the springs. The metal in all the castings is arranged so as to make use of thin webs giving the maximum strength for the weight. The rivets used are $\frac{3}{4}$ of an inch in diameter, their number and distribution being calculated to be more than ample for all requirements and severe service has shown that this calculation is correct as no loose rivets have been reported on any of over 800 trucks which have been put into use. Another good feature of this truck is the brake beam and the method of attaching it. It is generally conceded that the

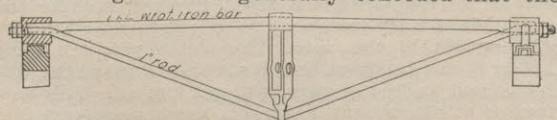


FIG. 5.—BRAKE BEAM.

only proper place to hang a brake beam is to the truck, but there is no point where it can be attached outside the wheels and on most trucks if it is hung inside it must be so low that it is liable to cause a wreck at any time by striking obstructions which may be between the rails. Numbers of bad wrecks have been caused by draw-bar heads falling on the track and catching on the brake beams and other parts of the trucks. The brake beams on this truck are hung so high that the lowest point is 13 in. from the top of the rail and is above the bottom of

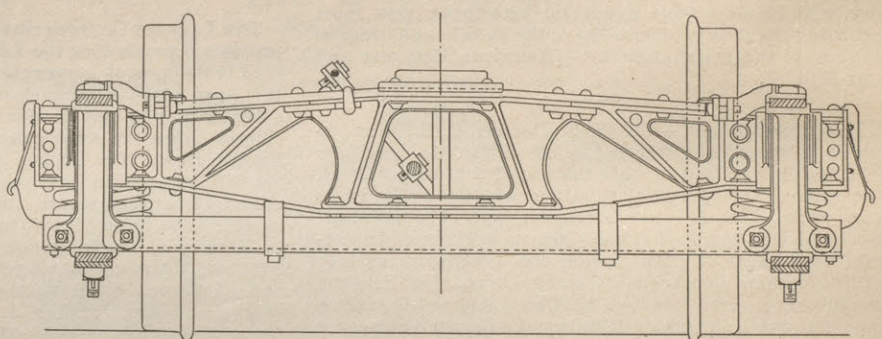


FIG. 4.—CROSS SECTION.

centers and loading on the center plate. The permanent deflection at the center under a load of 147,000 lbs. was $\frac{3}{4}$ of an inch and at 149,000 lbs. design are in the lower member parted. Trucks of this design are in use under more than 800 cars, 200 being on the Illinois Central Railroad, 200 on the Louisville, New Albany & Chicago Railway, 300 for the Illinois Steel Co. and others are under miscellaneous small lots of cars. These trucks are in use under steel cars built by the Universal Construction Co., which have been illustrated from time to time in these columns. The coal cars are in regular service carrying loads of from 70,000 to 80,000 lbs., and the trucks are giving perfect satisfaction. The truck was designed by Mr. H. C. Williamson and is being placed on the market by the Haskell & Barker Car Co., of Michigan City, Indiana.

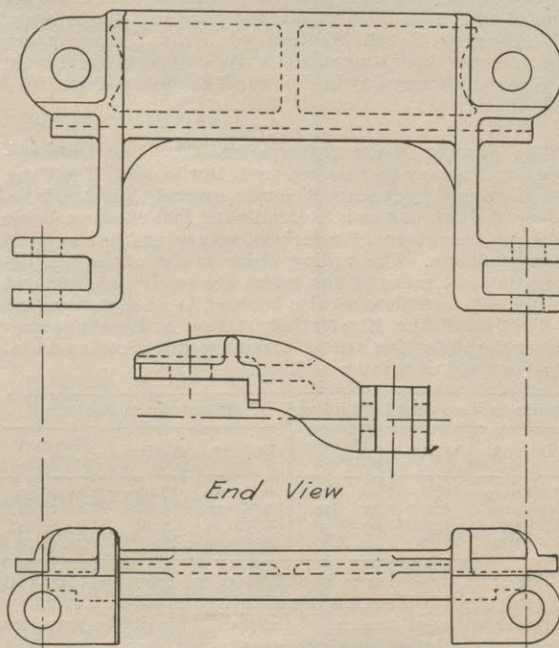


FIG. 6.—BRAKE BEAM HANGER.

The Hamburg-American Steamship Co.'s new twin-screw steamer Pennsylvania was launched at the Harland & Wolff shipyard at Belfast, Ireland, September 10. The new vessel is the largest merchant steamer afloat, being of 20,000 tons carrying capacity. She is 558 ft. long, 62 ft. beam, and 42 ft. deep. The Pennsylvania is designed to make an average speed of 14 knots an hour, and will also carry a limited number of passengers, 200 first cabin, 250 second cabin, and 1,000 steerage.

A DIAGRAM FOR HAULING AND TRACTIVE POWER OF LOCOMOTIVES.

An interesting and exceedingly ingenious diagram from which the hauling capacity and tractive power of locomotives can be taken is shown by the accompanying illustration, which was prepared from a print received through the courtesy of Mr. E. M. Herr, assistant superintendent of motive power and machinery of the Chicago & Northwestern Railway, by whom the scheme was worked out. Its purpose is to compare the power of locomotives having different sized cylinders and driving wheels, and to make it possible to ascertain the effect of changing the dimensions of these parts on the power of the locomotives without the necessity of going through any calculations. The diagram shown was worked out for engines with from 15 to 22 in. cylinders with 24 in. stroke, with driving wheels from 48 in. up to 80 in. diameter and working under steam pressures of from 150 to 190 lbs. and upon grades ranging from a level up to 90 ft. per mile.

A glance at the diagram will show the loads hauled in tons as ordinates and the tractive power in pounds as abscissas. The grades are laid out in straight lines at angles with the horizontal. At the upper and left hand portion of the diagram five horizontal lines give the steam pressures and oblique lines show the different diameters of the cylinders. The main portion of the diagram is crossed by hyperbolas, of which there are five for each cylinder, one corresponding to each steam pressure. These curves are given in dotted lines in accordance with the key upon the right hand side of the diagram. It will be noticed that the hyperbolas are connected by vertical lines to the intersections of the oblique cylinder lines with the lines of steam pressures. An example will explain the use of the diagram.

Suppose the engine to have 18x24 in. cylinders, driving wheels 70 in. in diameter, and to carry 190 lbs. steam pressure, the desired information being the tractive power and the hauling capacity on a grade of twenty feet per mile. The starting point in this case is at the upper right hand end of the oblique line marked 18 in. cylinders. The upper end of this line is opposite the point marked 190 lbs. Now tracing the vertical line down from the point already referred to, and following the hyperbola, a point will be found where the hyperbola intersects the horizontal line from a point at the left marked 70 in. wheel. From this intersection the tractive power is found by following the perpendicular down to the margin, where it is seen to be 19,000 lbs. The hauling capacity on a twenty foot grade is then obtained by tracing the vertical from the intersection of the driving wheel line and the hyperbola until it strikes the oblique line representing the grade. In this case the grade being 20 ft. per mile, the oblique line is intersected at a point opposite 1400 tons, which is the maximum load in tons.

The following formulas were used in constructing the diagram:

$$T = \frac{PLd}{D}$$

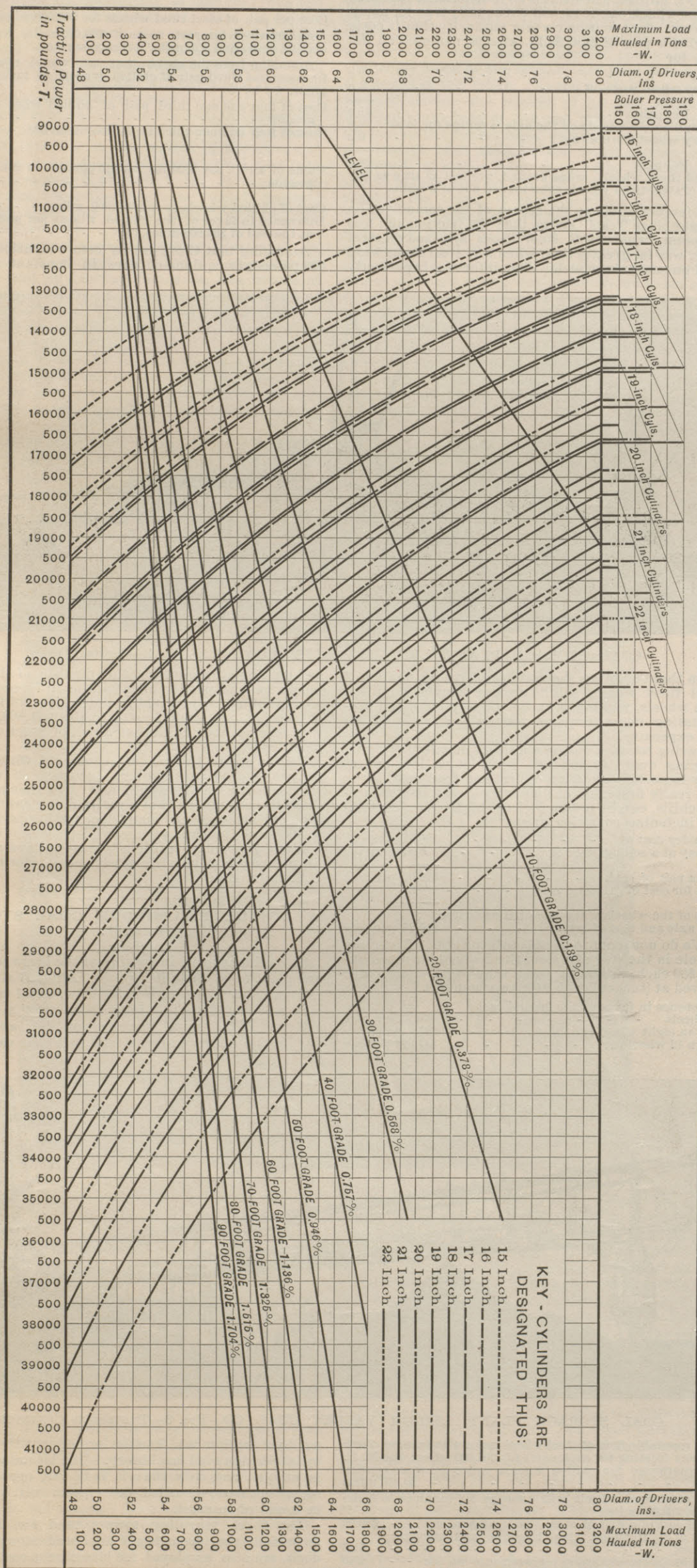
$$w = \frac{T}{2,000 \tan a + F}$$

in which

D = diameter of driving wheels,
d = diameter of piston,
F = friction per ton (taken at 6 lbs.),
P = mean effective pressure (taken at 0.9 boiler pressure),
T = tractive power in pounds,
w = maximum load hauled in tons,
tan a = tangent of angle of grade,
L = length of stroke in inches.

It is obvious that the diagram is intended only for comparing engines going at very slow speed and before the acceleration has decreased the mean effective pressure below 0.9 of the boiler pressure. It will be very convenient in determining the work which locomotives ought to do upon divisions over which they have not been given a practical trial rating with cars by comparing them with engines which have had such ratings. It will also be useful in showing the effects which may be expected from different proportions of cylinders and driving wheels in designing locomotives. Two other diagrams have been prepared giving the same information for from 15 to 18 by 24 inch cylinders working under boiler pressures of from 120 to 150 lbs. and one for from 18 to 22 by 16 inch cylinders working under steam pressures of from 150 to 190 pounds per square inch, all three of the diagrams having been worked out for driving wheels of from 48 to 80 in. in diameter, and from these three the power may readily be compared between any designs of modern locomotives. The convenience of such an arrangement in the drafting room and on the desks of superintendents of motive power and master mechanics will be apparent at a glance.

TRACTIVE AND HAULING POWER DIAGRAM.



CAST IRON VS. STEEL TIRED WHEELS.*

One of the most difficult questions that has cropped up unexpectedly again and again, and like Banquo's ghost would not down, is the far reaching one as to whether we should use only steel tired wheels under passenger equipment cars and passenger engine tenders, or are the chilled wheels good enough.

Recently this question was forced on the writer's attention by some articles and notices in the technical papers, which if believed in and followed to, their natural conclusion would lead one around to the steel tired wheel makers' door for wheels for passenger cars, and necessitate the purchase and installation of wheel lathes at all the shops, increasing the first cost and maintenance cost of the passenger train considerably.

It is to the direct interest of the steel-tired wheel men to magnify the danger to passenger trains from broken cast iron wheels. How often have we heard of a passenger train being wrecked or a passenger being hurt or killed by a broken wheel? A search through the newspaper records of accidents for 1895 showed that there was just 22 cases of wrecks or derailments, freight and passenger, caused by broken wheels in the year, while there must have been something like 9,720,000 chilled iron wheels constantly in service under both passenger and freight cars during the year.

Reference to the same record showed that during the year five passengers lost their lives in wrecks due to "defective equipment," which general heading covers a multitude of sins. I could not ascertain definitely that a single passenger had been hurt or killed in 1895 in an accident caused by a broken wheel on a steam railroad, and the number of passengers carried during the year must have been close on 600,000,000. The following is believed to be a fairly correct estimate of the number of accidents caused by broken wheels 1886 to 1894, inclusive:

1886	1887	1888	1889	1890	1891	1892	1893	1894
37	27	48	28	37	39	46	48	33

While considering the question of relative safety, it is proper to mention that the steel-tired wheels are not the perfect panacea for the broken wheel problem. Reference to the M. C. B. reports on steel-tired wheels will show records of very considerable percentage of failures, and reference to the Board of Trade returns for the English Railroads, and to the reports from the German Railway Union, show a considerable number of steel-tired wheel failures and some accidents from these, but the figures are not in such shape that comparisons can be made.

In a published report of some experiments made on the Pennsylvania Railroad to ascertain the effect of heating the treads of chilled wheels, it is stated that chilled wheels of various makes were placed in the sand and molten iron poured around the tread, when it is found that a large proportion of the wheels so tested cracked and broke, while the wheels made at the Altoona foundry would almost all stand this treatment without breaking. Incidentally it is elsewhere stated in a technical journal that the Altoona wheel mixture was: Charcoal iron, 30 per cent; coke iron, 15 per cent; steel, 5 per cent; old wheels, 50 per cent.

We do not know if the wheels which stood the test mentioned were made from this mixture, but we can assume that wheels can be made at a reasonable cost that will stand such a test at other foundries as well as at Altoona, and can be bought at a small advance in price, if we insist on having them, and will pay for them. That a wheel in actual service will never be heated in such a manner as these test wheels were heated is reasonably certain. Reference to the report of the laboratory test of the brake shoe committee in the M. C. B. proceedings for 1895 shows that in the freight tests, where the stops were made from a speed of 40 miles per hour, high enough for ordinary passenger train service in the country generally, that while the shoes get very hot, the wheels never become too hot to lay the hand on, and only after five stops in succession, from 60 miles an hour did the wheels become hot enough to require cooling down. The writer has frequently passed along freight trains coming to rest at the foot of a long grade and noticed the shoes smoking hot, and has felt the wheels which had been braked down 12 miles of steep mountain, under 30 ton loads, to find that the wheel treads were not uncomfortably hot to the hand. It is believed that leaving a red hot brake shoe set against a standing wheel is very apt to cause cracked wheels, because the wheel where it is in contact with the hot shoe will of itself be heated up, and severe strains would be set up in the plates and ribs due to the local heating.

Assuming that there are about 34,000 passenger equipment cars in constant service, and that the numbers of wheels in service under these cars (4 and 6 wheel trucks) would approximate 306,000; that a first-class chilled 33 in. wheel weighs 600 lbs., and that the average weight of the steel tired 33 in. wheels (see M. C. B. report of 1895) is 802 lbs.—some of them weigh over 1,000 lbs.—this would mean that the difference in the weight of this many wheels alone, as between cast iron and steel tired wheels, would be 30,900 tons, which we would be burning coal to haul, at speeds up to and over 60 miles per hour, around the country.

*From a paper read by Mr. R. P. C. Sanderson, before the Southern & Southwestern Railway Club.

Now, as regards the running qualities of steel tired vs. chilled wheels, it is an indisputable fact that chilled wheels can be turned out equally true for much less cost. I have it on certain authority that it costs to grind a pair of new 33 in. wheels, mounted on the axle, for

Labor	-	-	-	-	-	18 c
Emery wheel worn off	-	-	-	-	-	3 c
Per pair	-	-	-	-	-	21 c
Regrinding old wheels on the axle, average for labor	-	-	-	-	-	22 c
Emery wheel worn away	-	-	-	-	-	6 c

And these wheels, when ground, are just as true as any pair of steel-tired wheels ever turned out of a lathe.

Reference again to the report of the committee on "Brake Shoe Tests" shows that the friction and loss of metal, where soft steel shoes are used on steel tires, was far greater than when soft steel shoes were used on cast iron wheels. The inference is perfectly

Deduct value of scrap say 1108 lbs. at \$8 and \$10 ton of 2240 pounds - - - - - 4.94

Cost per pair of steel tired wheels for 260,000 miles \$82.41
Exclusive of interest account 260,000 miles represents about 8 years and 8 months' average service.

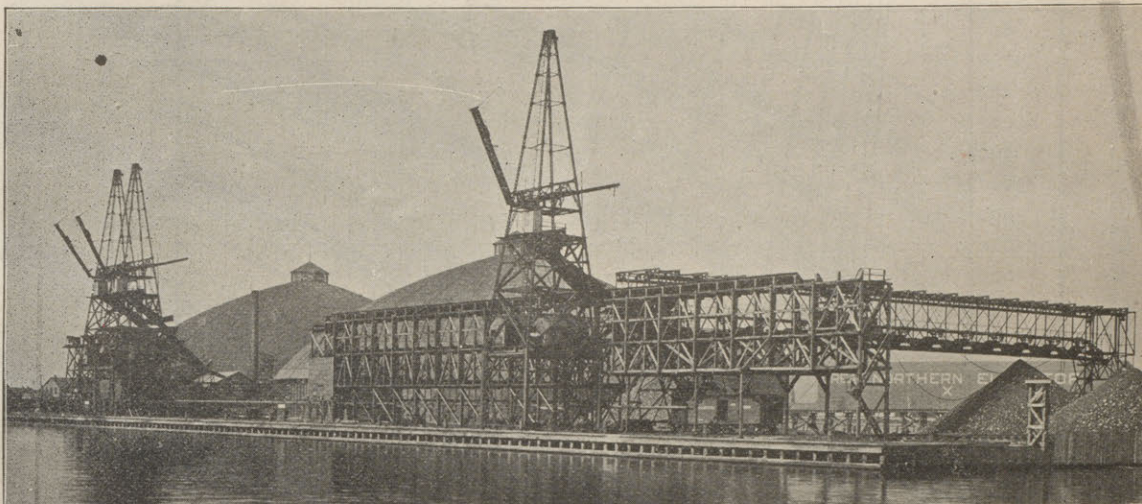
Assuming from the above that we would need to use four and one third pair of chilled wheels to make 260,000 miles, we have

Cost of four and one third pair of chilled wheels ground - - - - - \$43.91
Cost of four and one third replacements at 60c - - - 2.60

Value of scrap, say 3020 lbs., at \$10 per ton of 2240 pounds - - - - - 22.41

Cost of chilled wheels to run 260,000 miles - - - \$24.10
Difference in favor of the chilled wheels per pair at the end of 260,000 miles, say - - - - - \$58.31

Assuming that there are as before mentioned, 34,000 passenger equipment cars in constant service,



COAL STORAGE PLANT, LEHIGH VALLEY COAL CO.—FIG. 1.—GENERAL VIEW.

plain that on curves the rail wear from the flanges of steel tired wheels will be greater than from chilled iron wheels, making a harder pulling train and necessitating more frequent renewals of rails, which are expensive.

Having touched on the questions of safety, weight, running qualities and rail wear, let us look at the very important question of first and final cost.

A really first-class chilled wheel, cast in contracting chills, can be produced from high grade materials, including royalties, at a

Foundry cost of	-	-	-	-	\$4.60 each
Or say at a selling price of	-	-	-	-	5.00 each
For a pair of such	-	-	-	-	\$10.00 per pair
Add for cost of grinding true	-	-	-	-	21

Cost of the wheels when mounted, exclusive of axle and cost of boring - - - - - \$10.21 per pair

We do not seem to be able to buy a really first-class article in the way of a steel tired wheel for much under \$50 each, although some that promise well are offered at (turned) each \$40; two such \$80.

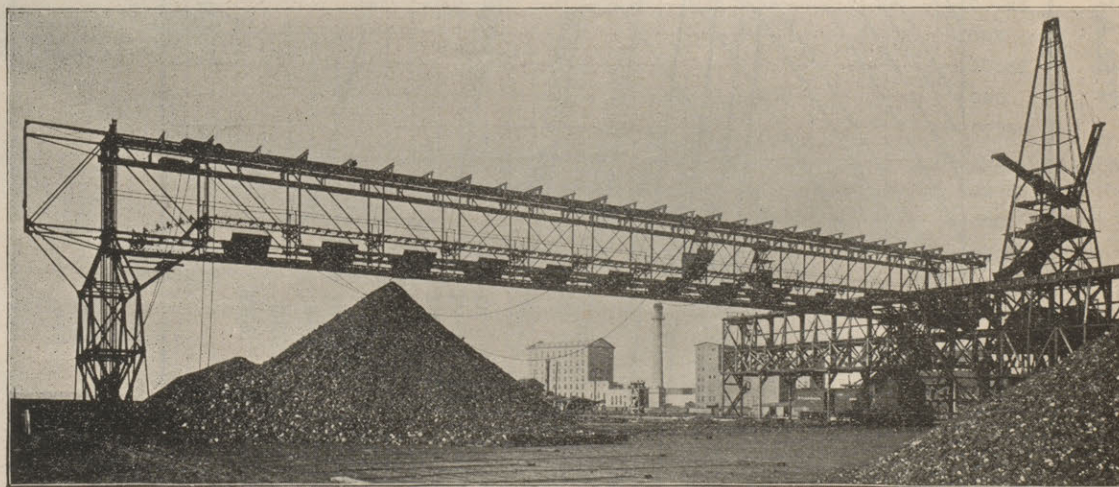
Difference in favor of the ground cast wheels	-	-	-	-	\$69.79 per pair
For an eight wheel car this is	-	-	-	-	\$279.16 per car
For a 12 wheel car	-	-	-	-	\$418.74 per car

and making allowance for the number of six wheel trucks under a portion of them, the difference in the amount of money invested in the one item of first cost of wheels alone would amount to about \$1,863,540, and this does not include the extra cost of stock wheels, machinery, etc.

Reviewing all the above arguments, which while not pretending to absolute accuracy in some respects, are as correct as necessary, it seems proper to draw the conclusion that a really first class 600 lb. 33 inch chilled wheel, ground true, costing perhaps 30c to 50c more than an average wheel, bought on rigid test and guarantee, especially marked and reserved for passenger service, is good enough for ordinary U.S. railroading.

A UNIQUE BITUMINOUS COAL STORAGE PLANT.

Some time since * in writing of the large coal storage plant to be installed by the Lehigh Valley Coal Company at West Superior, Wis., brief reference only was made to the bituminous portion of the system. The novel feature of the anthracite part is the ability to house and, with the ease of an



COAL STORAGE PLANT, LEHIGH VALLEY COAL CO.—FIG. 2.—TRAVERSING CONVEYOR.

A reputable firm of steel wheel makers guarantee their wheels (costing \$50 each new) for 260,000 miles; the M. C. B. guarantee for chilled wheels under the same service is - - - - - 60,000 miles

The steel tired wheels will average 3½ turnings to make the 260,000 miles.

First cost of a pair of steel tired wheels, say	-	-	\$80.00
Cost of 3½ turnings, shop handling and machine work	-	-	5.25
Cost of 3½ removals and replacements at 60c	-	-	2.10

\$87.35

outdoor equipment, handle large quantities of coal by latest improved machinery. The bituminous part is unique, and now that it is in full operation, a somewhat more detailed description will probably be found of interest.

The three traveling towers used for hoisting anthracite coal from boats anchored alongside the dock, are also employed for bituminous coal. They

*The Railway Review, December 15, 1894.

each operate a two ton automatic bucket, and may all three be used simultaneously to take coal from the different hatches of a boat and chute it to the upper run of the wharf conveyor located on the frame work shown parallel with the dock front in the photographic view reproduced in Fig. 1. This conveyor is reversible and will carry coal in either direction and on both its upper and lower runs. If it is desired to at once reship the coal, the upper run will carry it to the pocket at the end of the frame work. At intervals in the bottom of the trough of the upper run are discharge gates. Coal that is to be taken to storage is allowed to fall through these gates to the traversing conveyor, which projects under the upper run of the wharf conveyor and above the lower run.

The traversing conveyor clearly illustrated in Fig. 2 spans the storage ground on a truss supported at either end by moving standards, the trucks of which run on tracks extending to the extremities of the wharf conveyor. It employs a double strand of $\frac{1}{4}$ in. Dodge chain, with 10 x 30 in. flights, overhead Dodge idlers for the return of the chain, and a trough with a movable steel ribbon bottom, which can be adjusted so that coal can be dropped from the conveyor at any point within its length, or the width of the storage ground. It is deemed inadvis-

preventing the truck from going further forward, while the backward tendency is overcome by a hook on the truck automatically engaging with the stop. The bucket is suspended by a rope which runs over a pulley at the back end of the truck, passes through the pulley block of the bucket, and then is fastened to the end of the truck. As the truck is making its forward motion the bucket, of its own weight, is lowered to the base of the coal pile. Power is then applied to the bucket rope, and coal is scooped into the bucket as it ascends, the truck having been "stopped" at such a point as to cause the bucket's mouth to feed against the pile. When the bucket reaches the truck, it engages with a lever, which holds it in position and releases the hook engaging stop. The pull still being on the rope, the truck is traveled toward the hopper, previously moved to and clamped in position over one of the several chutes through which coal is delivered to the conveyor trough. On entering the hopper the hinged door of the bucket is unbolted by a lever arm attached to it striking a projecting plate, and the bucket having been emptied, its truck is again pulled forward, its door automatically bolted, and the lever mechanism holding it up to the truck is tripped, allowing the bucket to descend to the base of the pile, as before.



COAL STORAGE PLANT, LEHIGH VALLEY

COAL CO.—FIG. 3.—CONSTRUCTION OF CONVEYORS.

able to store bituminous coal to a height greater than 30 ft., on account of the danger of spontaneous combustion from the pressure of a higher pile, and for this reason the standards referred to were made 30 ft. high. These 30 ft. standards, the wharf conveyor, about 300 ft. long, and the traversing conveyor spanning the 245 ft. width of the ground, outline a space within almost all of which it is possible to store coal. With the means for storing say 50,000 tons of bituminous coal the Lehigh Valley Coal Company is enabled to anticipate the stoppage of transportation by boat during the severe Wisconsin winters.

Not only is coal stored most advantageously, but it is taken from the storage pile to the reshipping pocket in a very ingenious and simple manner: From the top girders of the traversing conveyor are suspended iron rails, which form a passageway on either side for trucks. Two of these trucks are placed in each passageway; one to carry the hopper, shown in position in Fig. 2, and the other a scoop shaped bucket. By means of a rope connected with the source of power, the bucket truck is pulled forward until it reaches the desired position on its railway, where a movable stop is bolted,

The traversing conveyor, which deposited the coal in storage, is now reversed and conveys the coal to the lower run of the wharf conveyor. By the latter it is chuted to cars brought to the pocket by the rope haulage, not shown in the illustrations, but which drills cars not only to the bituminous, but also to the anthracite pockets. Fig. 3 shows a corrugated iron engine house located on one of the traversing conveyor standards, from which through rope power is obtained for moving the traveling frame work, driving the conveyor, operating the one ton buckets, and adjusting the ribbon bottom of the conveyor trough. The wharf conveyor is independently driven, and the traveling towers are operated by motors placed on each.

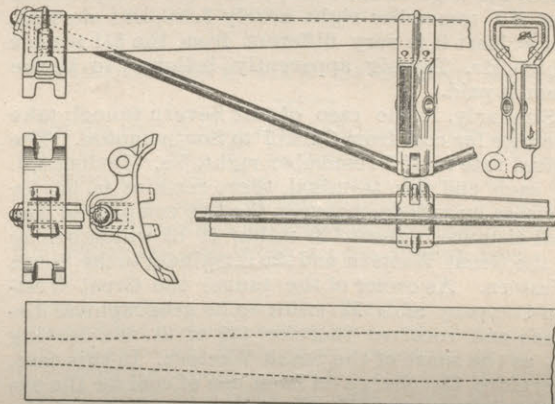
It will be seen, that the handling of the coal, in each operation of storing and reloading, is entirely mechanical and continuous. The cost of handling is reduced to the minimum, and with such a system a given stock of coal is stored and reloaded in the least possible space, and the danger of coal famine on account of bad weather, strikes at the mines, or other causes, is greatly lessened. The plant was constructed by The Dodge Coal Storage Company,

of Nicetown, Philadelphia, the designers and erectors of the anthracite outfit operated in connection with it, as also of the numerous plants of the "Dodge System" installed for the large coal carrying railroads of the east. Acknowledgment is made to Mr. S. Howard Smith, treasurer of the Link Belt Engineering Company of New York and Chicago for the information concerning this plant and for the photographs from which the illustrations were prepared.

A NEW METALLIC BRAKE BEAM.

A metallic brake beam making use of a flat steel plate pressed into a channel form for the tension member and having a varying cross section, has just been patented by Messrs. Chas. L. Sullivan and C. E. Burnap and placed upon the market by the American Brake Beam Co., of Chicago. The objects to be attained by this design were to provide an increase of vertical stiffness at the center and an increase of lateral stiffness at the ends of the beam. Further than this it was sought to so construct the beam that it would always be in adjustment and would not permit of changing the camber in making adjustments of other parts of the brake rigging as in taking up the slack to decrease the piston travel. The construction shown in the accompanying illustrations does not make use of nuts to tighten up the beam in giving it its original camber, and the camber cannot be changed by altering the tension of the tension member. In constructing the beam the tension member is put on while hot and it draws the compression member up to the required camber by its contraction in cooling.

The form of the piece of steel from which the compression member is made is seen in the illustration to be a rectangular flat plate, which is bent in a former upon the dotted lines, into the shape shown in the partial views of the completed beam. This



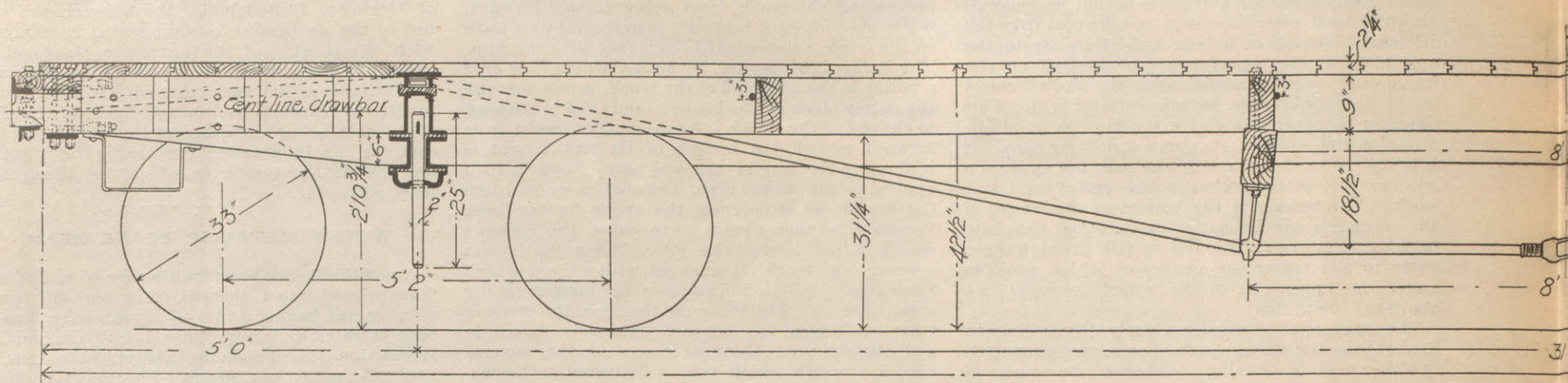
A NEW METALLIC BRAKE BEAM.

gives the compression member the form of a channel which has a wide web at the center and a comparatively narrow web but wide flanges at the ends. The tension member is a round rod with heads forged upon each end. These heads pass through the brake heads and are held by split washers which are placed over the ends of the rod to prevent the ends from slipping back through the brake heads. The holes in the heads are larger than the enlarged ends of the rod so as to permit the rods to enter without difficulty. The strut is prevented from slipping along the compression member by an indentation in the channel which fits a corresponding groove in the strut holding the casting firmly in place.

THE ENGLISH RAILWAY CLEARING HOUSE SYSTEM.

To the Editor of the Railway Review.

DEAR SIR:—Mr. Taussig in his interesting and accurate account of our railway clearing house system states that our terminal charges are enormous. I should like to point out that Mr. Taussig's belief may be correct, but to judge from the illustrations he gives, appears to be largely based on a misunderstanding of the actual facts. Further, whether the terminals be enormous or not is a matter of indifference to the shipper who never pays them separately and has consequently no knowledge of or interest in their amount. Let me give instances—and for the sake of convenience I will take those mentioned by Mr. Taussig himself—showing how both our terminals and also our special pontages—or as we call it, "bonus mileage"—are charged. A man sends a ton of fish from Wick to London via the Forth Bridge Route, actual distance 751 miles. The invoice delivered to him makes a single charge of 70 shillings for the entire service of collecting the fish from the quay at Wick, carting it to the station, carrying it thence to London, and finally carting to Billingsgate market. The clearing house deals with this 70 s. as follows:—



FLAT CAR 70,000 LBS. CAPACITY—NORTHERN PACIFIC RAILWAY

First, it deducts 4 s. for the Highland Company as "carted terminal" in Wick, and 8 s. 6 d. for the Great Northern as "carted terminal" in London; the balance, 57 s. 6 d., it distributes between the companies concerned in proportion to their respective mileages. But the Forth Bridge Company is entitled to reckon its bridge, though only in fact $1\frac{1}{2}$ miles long as having a length of 19 miles. Consequently for clearing house purposes the Wick-London mileage must be taken as 770 miles. The actual division of the rate is therefore as follows: To the Highland Company for 306 miles 4 s. + $\frac{3}{8}\%$ of 57 s. 6 d.; to the Forth Bridge Company for $1\frac{1}{2}$ miles, $\frac{1}{70}\%$ of 57 s. 6 d.; to the North British Company for 110 miles $\frac{1}{70}\%$ of 57 s. 6 d.; to the North Eastern Company for 147 miles $\frac{1}{70}\%$ of 57 s. 6 d.; and finally to the Great Northern for 188 miles $\frac{1}{88}\%$ of 57 s. 6 d. + 8 s. 6 d. It will be seen therefore that the Forth bridge receives about 34 cents per ton as its total share of the rate. This charge may be regarded as high in America, even for a bridge which cost if I remember right nearly 3,000,000 l sterling, but at least it is very different from the \$11 per ton which Mr. Taussig apparently believes to be the amount paid.

Similarly, in the case of the Severn tunnel; take the rate for coal from Cardiff to Southampton. The actual rate is, if I remember right, 5 s. Deduct 3 d. at each end for terminal, there remains 4s. 6d. for division by mileage between the two companies. The real distance is about 120 miles, 90 of which belong to the Great Western and the remainder to the South Western. As owner of the tunnel the Great Western Company adds 12 miles to its geographical distance and receives therefor $\frac{19\frac{1}{2}}{13\frac{1}{2}}$ of 4s. 6d., leaving $\frac{99\frac{1}{2}}{13\frac{1}{2}}$ as the share of the South Western. In this case, therefore, the charge on each ton of coal for the use of the Severn tunnel is about 10 cents instead of Mr. Taussig's 16 dollars.

Let me just conclude by saying that as a matter of fact, this particular rate would be divided, not through the clearing house but directly between the companies concerned, as is indeed the ordinary course here in the case of mineral traffic. Let me add further that for simplicity's sake I have omitted details in the Wick case, and that writing away from books, I cannot guarantee the absolute accuracy either of the amount of the rates or of the distances. I am sure, however, that they are substantially correct, and in any case the point is not to specify rates but to illustrate a principle. I am, sir, very respectfully,

W. M. ACWORTH.

Underwood, Eng., Sept. 11, 1896.

FLAT CARS 70,000 LB. CAPACITY—NORTH-
ERN PACIFIC RAILWAY.

The Northern Pacific Railway has a number of 70,000 lbs. capacity flat cars now in course of construction at the South Tacoma shops which the courtesy of Mr. John Hickey, superintendent of motive power, machinery and rolling stock of that road permits of illustrating and describing in this issue. The total length of the car from out to out of sills is 41 ft.; the width is 8 ft. 6 in., and the height from the top of the rail to the center of the coupler, 2 ft. 10½ in., while the total height of the car from the top of the rail to the top of the floor is 3 ft. 6¼ in. The wheel base of the trucks is 5 ft. 2 in., and the distance between centers of trucks 31 ft. The wheels are 33 in. in diameter.

In the accompanying illustrations, Fig. 1 shows a half side elevation and half section of the car taken longitudinally. Fig. 2 gives a half section and half elevation of the truck showing the form of the cast steel truck bolster. Fig. 3 shows a half plan and side elevation of the truck showing the arrangement of the arch bars which brings the top of the truck

bolster 22½ in. above the top of the rail. The spring seat used with this truck is of cast steel and the form is shown in the drawings. In this view the attachment of the brake rigging is also shown. Figs. 4 and 5 show plan, elevations and sections of the cast steel body bolster. It will be seen that the design of this bolster follows in a general way the lines of those for other large capacity cars of this road as

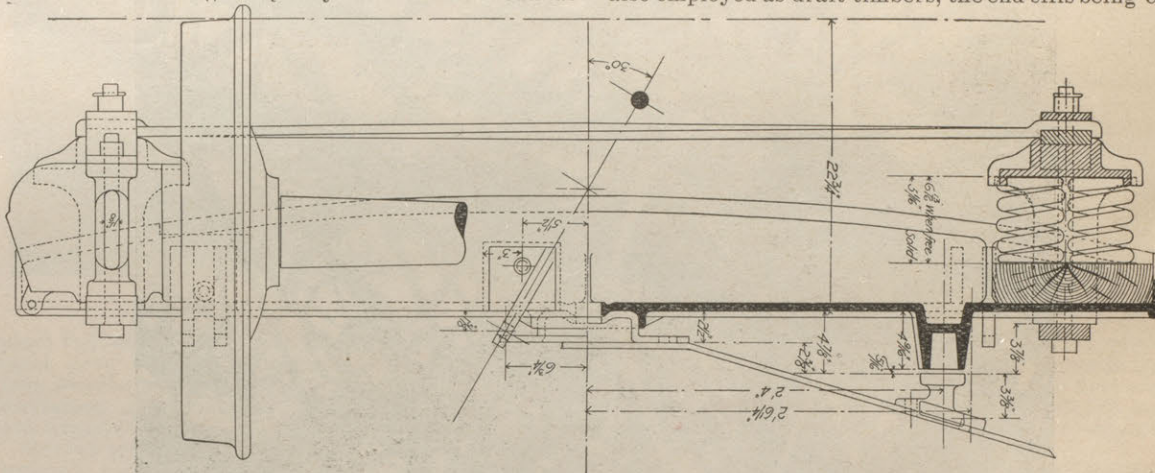


FIG. 2.—HALF SECTION AND HALF END ELEVATION OF TRUCK.

will be seen by comparing it with the one illustrated in the RAILWAY REVIEW of May 9 of the current volume, the difference in construction being that made necessary by adapting the bolster to be cast instead of made up of plates with riveted work.

This car has four truss rods each $1\frac{1}{2}$ in. in diameter and the needle beams are 8 ft. $10\frac{1}{2}$ in. apart. The side sills are 6x14 in. and have double tenons $1\frac{1}{2}$ in. thick, $1\frac{1}{2}$ in. long and 4 in. wide, measuring the width from the inside of the sill. These sills are secured

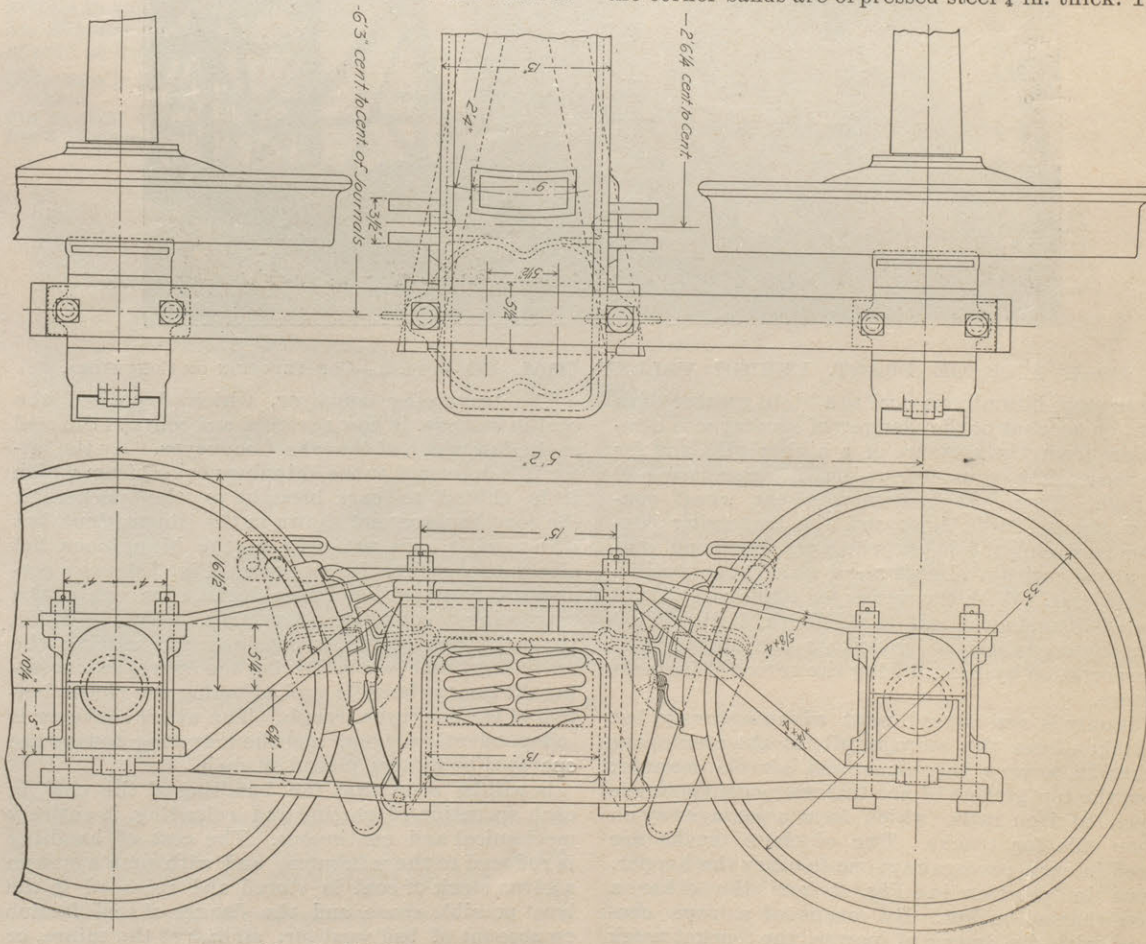
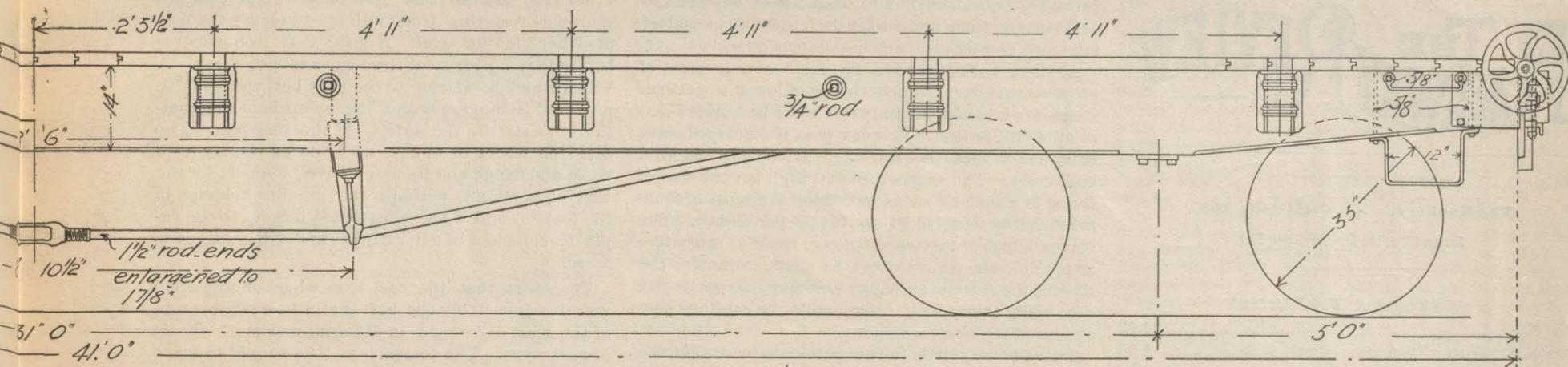


FIG. 3.—PLAN AND SIDE ELEVATION OF TRUCK.



RAILWAY—WITH LOW TRUCKS.—FIG. 1.—HALF SECTION AND HALF ELEVATION.

car has four $\frac{1}{2}$ in. cross-tie rods located as shown in Fig. 1, one rod being located at each set of packing blocks, the center of the rod being 3 in. below the top of the sills. The stake pockets, twenty in number, are of malleable iron. The hand brake is so arranged that it can be raised and turned to one side

contract with outside bodies instead of being constructed by the road in its own shops. All the tenons and joints between timbers are coated with "creosote" wood preserving paint. The design of the cars has been worked out with great care and the product is a construction in which great strength is

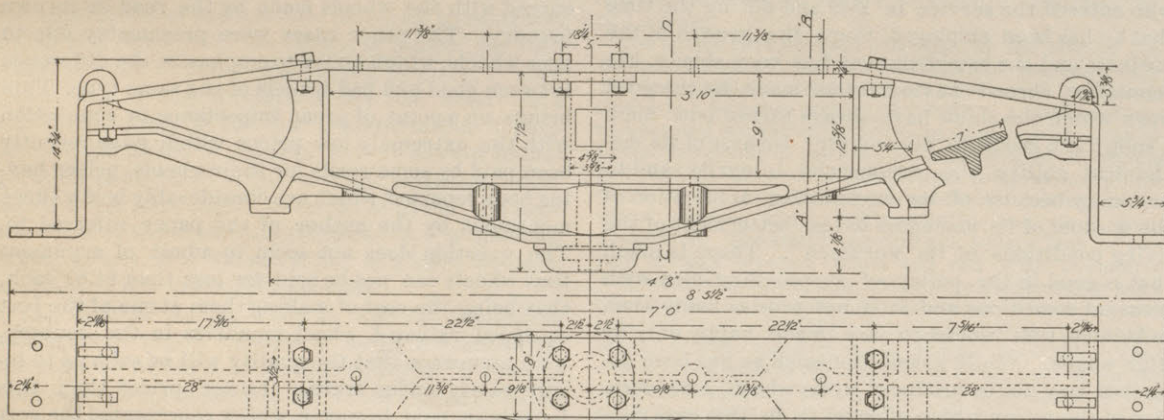


FIG. 4.—PLAN AND ELEVATION OF CAST STEEL BODY BOLSTER.

when not in use in such a way as to bring the outer end upon a $\frac{3}{4}$ x 2 in. hook secured to the end sill. The couplers are of the M. C. B. type fitted with a yoke. Two 8 in. two-coil draw-springs are used, having an exhaust capacity of 22,000 lbs., and the followers have projecting bosses for double springs. The sills are provided with $\frac{3}{8}$ in. pressed steel protection plates fitted with malleable iron draft lugs, each being secured to the center sill by six $\frac{7}{8}$ in. and three $\frac{1}{2}$ in. bolts. Metallic brake beams are used with Christie malleable iron brake heads.

One of the most interesting features of the car is the cast steel body bolster shown in Figs. 4 and 5. The bolster is in two parts, a tension member of $\frac{3}{4} \times 7$ in. iron and a compression member of cast steel made into the form shown in the illustration which embraces the side bearings and supports over them as well as the center support of the bolster, in one piece. In Fig. 5, sections of the bolster are shown taken on

obtained apparently without an undue increase in the weight of the car.

A METALLIC CAR ROOF.

A form of metallic car roof which is made up of pressed sheets with locked seams and so arranged as not to require the nailing of the sheets, is illustrated in the accompanying engraving. This roofing is intended for either inside or outside use, and it is arranged for attachment in such a way as to eliminate difficulties from contraction or expansion. One of the special claims made for this form is that it may easily be repaired. The expansion and contraction is not confined by any fastenings in the form of screw rivets or bolts, the movement being taken up by the rolls at the fastenings. In the illustration A and C are the end sheets and the intermediate ones are in

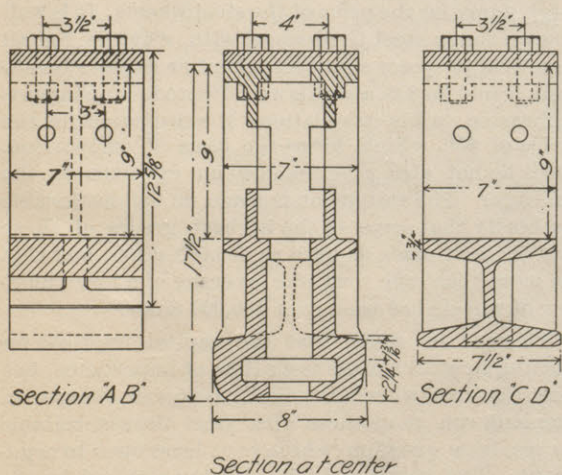
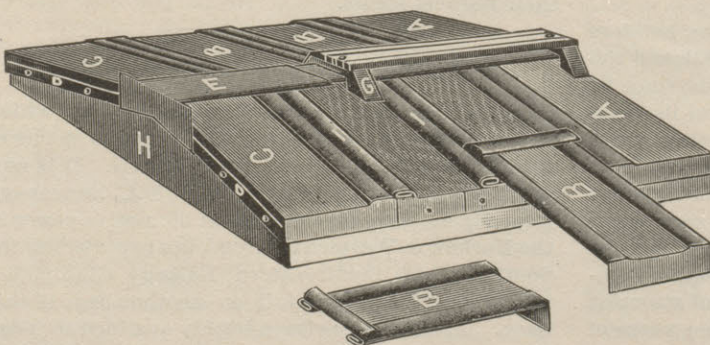


FIG. 5.—SECTION THROUGH BOLSTER.

lines A B and C D of Fig. 4, and also one at the center which shows the form of the support at that point. The lower part of this casting takes the place of a top center plate. Each bolster weighs 655 lbs. By reference to this drawing, the method of attaching the sills and of securing the outside truss rods is seen. At the right in Fig. 4 a sectional view of the lower member of the bolster is given showing the form of the casting between the side bearings and the side sills. The cars are fitted with Westinghouse freight brakes with retaining valves and the specifications in regard to every part are as carefully worked out as if the cars were to be built by



dictated by the letter B. What are termed drip conductors are shown at I I, extending across the car roof. The lock for the ridge is shown at E, which also forms the foundation for the running board. The plates shown at E are made of malleable iron and the bolts which are used to fasten them down are cast into them. The roof is called the Eureka Independent Car Roof, and further information concerning it may be had upon application to Mr. John Voelkel 1511 Franklin avenue, St. Louis, Mo. The special claim made for this form of roof is that the distortion of the roof itself due to the racking of the car or to expansion and contraction will not cause leaking.

Drawings of the M. C. B. Standards.

The following is a copy of a circular received from Mr. J. W. Cloud, secretary of the Master Car Builders' Association, whose office is 974 the Rookery building, Chicago:

Lithograph copies of the drawings of standards (sheets M. C. B., 1 to 12, inclusive) and recommended practice (sheets M. C. B., A to E, inclusive), illustrated on a reduced scale by seventeen sheets in the back of the Report of Proceedings for 1896, may be had on a similar number of sheets, 30 x 38 inches, by applying to the secretary at 974 Rookery building, Chicago, Ill. Blue prints can be taken from these sheets. The sheets will be sold at 25 cents each, plus postage, when sent by mail. If needed for blue printing, they should be shipped by express, and orders should specify by what express company they should be shipped.

Blue print copies, 30 x 38 in., of the drawings of recommended practice (see plates C, D, E, F and G in back of proceedings for 1896), regarding axle and journal box and contained parts for cars of 80,000 lbs. capacity, may be had by applying to the secretary, same address as above. These blue prints will be sold at cost, which we now estimate will be about 30 cents each.

Pamphlets containing the text of the standards and recommended practice, same as printed in the proceeding of 1896, will be furnished similarly at 25 cents each.

A RAILROADER'S VIEW OF SOUND MONEY.

On the recent visit of the Chicago railway men to Canton, O., Mr. W. E. Beecham, of the Chicago, Milwaukee & St. Paul Railway, presented to Mr. McKinley a badge of the pattern worn by the employes of that company with the subjoined remarks, and which are well worth a reproduction here. He said:

Major McKinley—About thirty-six years ago I had the distinguished honor of shaking hands with Abraham Lincoln, the great war president, who was then on his way to Washington to be inaugurated. At that time the country was confronted by a crisis the most serious and dangerous that had arisen in its history. The perpetuity of our institutions was threatened and the national authority defied, but the loyal people rallied to the support of the government at the call of our noble president, and after a long and bloody strife restored the union to its former glory, and since that time we have lived in peace and comparative prosperity.

Among the first to respond to the call of the country in those trying times was the man who has now been chosen as the standard bearer by the sound money people of the United States, who believe that their beloved country is again confronted with a dangerous crisis in its affairs, and who, irrespective of former party affiliations, are once again rallying to its support. In antebellum days the country was divided on sectional lines and an attempt was made to dissolve the union. In these days the national honor is assailed and the faith and credit of the country is in peril.

We, as wage earners, believing that the interests of the company by whom we are employed would be seriously impaired, and consequently our individual interests would suffer and the

welfare of our families be at stake, if the free coinage of silver should prevail, have come, sir, to assure you that we are heartily in favor of sound money, in which our wages are now paid, and that we have no desire for any other.

Some of us differ from you on the minor issues of this campaign, and when the present crisis is past we shall feel at liberty to return to our former political affiliations, and while remaining your personal friends, may again become your political opponents. We come here of our own free will to give expression to our sentiments in favor of sound money and to assure you that the great state of Illinois from which we hail and 18,000 fellow employes of the Chicago, Milwaukee & St. Paul Railway are behind us in support of these sentiments.

On behalf of our fellow employees located in ten great states of the union, I have the honor and pleasure of presenting you this token of our great esteem and personal regard, which is the badge of our organization. In conclusion let me say that, as before remarked, I have had the pleasure of shaking hands with a former president of the United States, and I now venture the prediction that I am shaking hands with our next president.

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CHICAGO, SATURDAY, OCTOBER 10, 1896.

MANAGERS of some large iron and steel concerns both west and east have testified to the fact that inquiries for furnace and mill material have multiplied during the past ten days. The latest advices, however, do not show that the buying of material has set in on a large scale. Some few purchases have been made of pig, but in finished products manufacturers act with indifference. The entire trade is aroused over the possibilities of November and December. Production in all lines it is recognized is below normal requirements. Repairs and equipments on railroads are kept at minimum limits. Stocks in all hands are light. Those who have work to give out give the very least. Yet in all directions the probability of heavier requirements and higher prices is recognized. The country wants to feel bed rock under its feet. Capitalists demand of the people a bond of good behavior for the next four years at least, before energizing agencies again flow into the channels of trade. The great iron industry stands waiting. Its equipment was never so perfect. Foreign iron markets are active. A stimulus has been imparted to production in all foreign manufacturing countries which American manufacturers are anxious to share. Prices are now evidently at bed rock, and the next departure will be to a higher and not a lower level.

PERSONAL INTERESTS OF WORKMEN.

The prospect of a manufacturing concern, builders of machinery, established in the year 1831, and the business of which has been conducted ever since by members of the family of the founder, is of itself interesting; but when this concern has grown from a minute beginning to an establishment employing an average of sixteen hundred hands and in its whole history has not had a single strike, the case seems the more remarkable. Such records can only be made by correct management and the methods employed to attain these results are worthy of attention from shop managers and sociologists. The works of the Whitin interests at Whitinsville, Mass., are referred to. They form the subject of an article by Mr. Henry Roland in a recent issue of the *Engineering Magazine*, in which the interesting statement is made that this happy situation has not been produced by any well laid out scheme of shop management but by the very simple plan of treating men as men ought to be treated, viz., in accordance with the principles formulated in the "golden rule". Mr. Roland says that there is not even the faintest trace of a defined policy except that of a full consideration of the effect of any business move on the earnings and the peace of mind of the workmen. The manager of the concern is quoted as saying: "We often do not do what we would prefer to do so far as we are concerned because it would affect our men unfavorably; we do not consult our men at all; we know of course

how they are situated, and what effect any change will have on them and we let their side of the matter influence us when we can consistently do so."

At these works there is no fixed arrangement of piece work, circumstances being allowed to govern. Piece work is used when work must be hurried and at other times the day's work plan is employed, care being taken that the workmen are fairly treated in both cases. The wages are not high but the cost of living is made as low as possible, the rents of tenements being from \$3.50 to \$14.00 per month. The surroundings of the tenements are made as attractive as possible and every effort is made to render the lives of the hands as happy as may be, particular care being taken with reference to the sanitary conditions of the shops and houses.

There is very little in the particular case referred to which may be copied elsewhere except the underlying principle of the whole management, and this is applicable everywhere. As summed up by the author referred to, it consists in considering first of all the limitations and the needs of their workmen in a highly uncommercial manner, which, nevertheless, has led to a sound and persistent commercial success.

There is one employee now engaged at these works who entered the service in 1839 and during the time that he has been employed there the growth of the business and the establishment has been steady, the reputation abroad having been made by the good work which the shops have always turned out. Such a shop "is a credit to the country because of its mechanical ability and commercial integrity; and to humanity because of its unremitting application of the wisdom of its managers to the betterment of the living conditions of its workmen". There is much that is good in the policy of surrounding men with pleasant conditions and it is not true as many seem to believe, that workmen are made happy only by high wages. While a condition such as has been described may not be produced everywhere, consideration of the policy which effected it in this case cannot fail to suggest methods of employing this principle to some extent in all cases where men are employed.

So far as any success has been attained in the establishment of correct relations between employer and employe it is directly traceable, both in kind and degree, to the teachings of the Nazarene declared in Palestine nineteen hundred years ago. Men may theorize on the one hand and organize on the other, but until the principles then proclaimed are made the controlling elements of both theory and organization failure is inevitable. It would seem that the experiences of the centuries would have taught this lesson as it has that of the necessity of one day's rest in seven. Divine law is not an arbitrary thing. It is the expression of the highest and best that is in us, and outside the question of religion, the nearer men conform to it the more nearly will they attain their highest ideals.

CAST IRON AND STEEL TIRED WHEELS.

One of the questions in railway practice which will not stay settled is that of the relative merits of chilled cast iron and steel tired wheels. It is now again brought to the front by Mr. R. P. C. Sanderson, formerly division superintendent of motive power of the Norfolk & Western Railroad, in a paper before the Southern and Southwestern Railway Club which is reproduced nearly in full on another page of this issue. The opinions of men highly qualified to judge of the advantages of these two types of wheels differ, and there seems to be no court to which the matter can be referred for final decision. Since the subject has been opened the opportunity will be taken to refer to it in the direction of calling attention to the real essence of the matter which is stated by the query, "What is the safest wheel"? The safest is the cheapest in the long run and the improvements which have been made in wheel manufacture have been such as to render the subject of interest to men who have not given it constant attention. When some men will not have steel tired wheels because cast iron ones are better, and when other men will not use cast iron wheels for any purpose because they are not safe, both cannot be right. Perhaps the cast iron advocate had unsatisfactory experience with a lot of steel tired wheels, and perhaps the

other man had bad cast iron ones. Such cases are known as resulting from failures to secure the best of either kind for trial. A good cast iron wheel is better than a poor steel tired one and vice versa. A wheel which is inferior to the very best that may be procured is dangerous and the solution of the question is as stated, the safest is the cheapest. The cast iron wheel of to-day with its extremely hard tread and flange and its tough strong support for the bearing portion is perhaps the greatest triumph of the foundry and it has contributed largely to the rapid development of our railways and will continue to do so.

To assert that the cast iron wheel or the steel wheel is invariably the best would be rash, because of the wide differences in different makes of wheels of each type. The comparison then should be made of the best only of each form. It is true of the best steel tired wheels, that of certain makes absolutely no cases of any breakages in service nor any of which have caused wrecks are known. It is reported on the other hand, that on a road having 40,000 cast iron wheels of a certain size and of different makes, there were 23 breakages which caused wrecks in a single year, and that out of this number only one case occurred with the wheels made by the road in its own foundry. The other cases were presumably due to poor wheels, which serves to emphasize the difference between good and bad wheels of the same type. This brings up a point of great importance in connection with the extremely low prices which have recently been paid by some roads for their wheels, prices having been reported which are considerably below those mentioned by the author of the paper referred to. The question does not seem to admit of argument that wheels can not be sold for less than \$4.80 each, that being the cost of making them at one of the best equipped railroad wheel foundries in the country, with assurance that the quality will be such as to insure safety under trains. Lower prices than this have been paid, however, which represented the cost and the maker's profits in addition. The manufacturers who are turning out wheels at these prices are probably giving all of quality that they are paid for, but the policy is not to be approved as a wise one from a purely business point of view, aside from the question of the dangers which the roads purchasing them incur by using wheels which were not the best that may be procured.

It is noticeable that in comparing the types, the remark is often made that the cast wheel is as safe as the steel tired type; but does anyone claim that the cast type is safer than the latter form? Even Mr. Sanderson does not claim this, and from all of the records obtainable at this time the evidence is strong that the balance of opinion favors the steel tired type in this respect. The author of the paper referred to fails to give emphasis to the dangers involved by the use of inferior cast iron wheels, and in his comparison of the cost of the two types he uses a high figure for the price of the steel wheels. It is well known that a steel tired wheel with what is for all practical purposes a perfect record as regards breakages is sold for \$38, and this would introduce an important difference in his calculations if substituted for the price of \$50, which forms the basis of comparison. Does he not also give too low an estimate for the mileage? The statement is made on unquestionable authority that some of the highest grades of these wheels have made as high as 700,000 miles, and that on more than one road the average of a large number of wheels has been over 500,000 miles.

There is no doubt that the capital required for putting in steel wheels is an item of importance, but that cast iron wheels are really better or cheaper in the long run than those with steel tires of reliable forms, is a question which is at least open to argument. The course which is being pursued by one superintendent of motive power at the present time is worth mentioning in this connection. He is making a systematic inquiry among other mechanical men as to their experience with wheels of all kinds and in various kinds of service, with a view of getting as much light as possible upon the present status of the wheel question, so as to make no mistake in his recommendations for the future. It is a good thing to bring this matter up occasionally, as it is sure to be the means of improving the wheel situation, which in some of its aspects needs frequent reviewing.

ABOLISH THE TON-MILE.

While it cannot be denied that the large amount of attention given of late to engine rating and car loading is fully warranted by the results which have been attained through such efforts, there is yet danger because of a misuse of information that it may result in actual loss of revenue. Indeed it may be fairly questioned if the present low basis of earnings is not in some degree traceable to this fact, and because of improvements in roadbeds in the way of reduced grades and fewer curves, the increased capacity of cars and the better loading thereof, and the heavier engines with a more careful attention to their haulage rating, thereby reducing the cost of the service, transportation charges have been unfavorably affected. In the fierce competition for business it is probable that rates have been reduced even more rapidly than expenses, until in most cases there is a balance on the wrong side of the profit and loss account.

The danger referred to consists in the fact that while the ton-mile basis may be preferable to any other in considering the question of expense, it is altogether objectionable as a basis for revenue. Without intending it the individual who first made the application of the ton-mile principle to rates was guilty of a crime from the effects of which the railroads of this country will never recover. "How much does it cost to move a ton one mile?" is a legitimate question for the transportation department of a railroad to consider, but the answer to that question as declared in the average statistical statement, is one that ought never to be given the least attention by the traffic department. As a scale for saving money, it is valuable, but as a basis for earning money, it is positively harmful.

The time is coming when it will be recognized that transportation instead of being a commodity, the price of which is to be determined by its cost, is a service the compensation for which should be based upon its value. The cost of transportation between given points by different routes varies largely and always will, but the value of the service between the same points by any of the routes, is identical at all times. The cost of hauling a trainload of grain from Chicago to New York over the Lake Shore & Michigan Southern, and New York Central roads, is materially less per ton-mile than the cost of hauling the same amount of grain via the Baltimore & Ohio route with its longer mileage and heavier grades, but the value of the service to the man who ships the grain is the same via both routes. The ton-mile in either case is a valuable factor for the determination of expenses, but it is of no use in the fixing of rates. The rate from Chicago to New York must be the same via all lines, and for the fixing of such rates the value of the service is the only factor that presents a common quality.

Another element which effectually disposes of the ton-mile as a basis for rates is the commercial disparity between that factor and the value of service. Broadly speaking, the cost per ton-mile is the same, whether the commodity hauled be silk or sand, silver bullion or iron ore, but no one will contend that the value of the service in both cases is identical or even approximate. To apply the ton-mile basis to rates would be to make impossible the movement of many articles which form a considerable bulk of the commerce of the country. If moved at all they must be carried for much less than the average ton-mile cost, and not to transport them would be to inflict a hardship which, under our present social order, would be excessive in the extreme.

As already intimated, this question receives new interest, because of a recent disposition to magnify the ton-mile basis as the determinate factor for both cost and revenue. As stated by a contemporary: "The problem now being worked out is 'how much does it cost us to move a ton one mile and how much margin above cost should be allowed in our rate to make a fair profit?' This problem will be solved upon the basis of present conditions of car and train service, and we will then be confronted with the additional problem, 'can the cost of moving a ton one mile be still further reduced to enable us to get a larger margin of profit or to still further reduce our rates?'" The RAILWAY REVIEW, foreseeing the effect which would be produced by the ton-mile fac-

tor in railroad statistics, has for years advocated its abolition. As a matter of fact, railroads do not and have never constructed rate schedules on the ton-mile theory. Legislatures and railroad commissions have made use of this basis to reduce rates, and some traffic officials, more enterprising than wise, have used the fact of a low ton-mile cost on their own road to enter into competition with another road having a higher basis; but as an active element in rate making, it is never considered. There is little doubt but that the injury it has caused because of its illegitimate uses as above indicated, is many times in excess of its value in reducing the cost of transportation. Indeed it may be questioned if the ton-mile basis is any more valuable for this purpose than the train-mile basis. In any event, the value of either factor is one of comparison and its use should be confined to the department in which it originates.

THE BREAKAGE OF STEEL RAILS.

An interesting paper upon the subject of the fracture of railway rails was presented by Mr. W. W. Beaumont before the British Association at Liverpool, September 16, for the following summary and discussion of which we are indebted to Engineering, of London:

The author first directed attention to the leading features in the history and characteristics of fractured rails, and from these the conclusion was drawn that the failure of any rail, however perfect, is chiefly a question of the number and weight of the trains passing over it. The effect of the rolling of the heavily loaded wheels of engines and vehicles was he said, the gradual compression of the upper part of the rails, and the production thereby of internal stresses which are cumulative and reach great magnitude. The static pressure per square inch of surface contact between wheel and rail with locomotive weights now common, was stated to be considerably more than 60 tons, and reaches 100 tons per square inch, and the pressure under heavily balance-weighted locomotive wheels at high speed is much greater than this. That which takes place in the material of a rail head under the action of very heavy rolling loads at high speed, is precisely that which is purposely brought into use every day in our iron works. The effect is, however, on the railways, obscured by the slowness of the growth and transmission of the forces which are ultimately destructive.

The paper went on to state that when a piece of iron or steel is subjected to pressures exceeding the limit of elastic compression, by a rolling or hammering action, or by both these combined, the result is spreading of the material and general change of the dimensions. This is equally the case with a plate hammered or rolled on one side while resting on a flat surface, or with a rivet when hammered over. The author held that in all these cases and many others, the hammering or rolling work done upon the surface tends to compress the material beneath it, but being nearly incompressible and unchangeable in density, the material flows, and change of form results. Generally the material thus changed in form suffers permanently no greater stresses than those within its elastic limit of compression or extension. When, however, the material is not free to flow or to change its form in the directions in which the stresses set up would act, the effect of continued work done on the surface is the growth of compressive stress exceeding elastic resistance.

In the case of railway rails the freedom for the flow of the material is very limited, especially when considered with reference to the rolling and hammering media and the surface contact between rails and wheels. Hardening of the surface takes place, and destructive compression of the surface material is set up. If the material be cast iron the destructive compression causes crumbling of the superficial parts, and the consequent relief of the material immediately below it from stress beyond that of elastic compression; but when the material is that of steel rails the stress accumulates, the upper part near the surface being under intense compression, differentiating from a maximum at the surface. The compression gives rise to molecular stresses, analogous to those which, on the compression side or inner curve of a bar bent on itself, originate transverse flaws on that side. This condition of compression exists along the whole length of a rail, so that when its magnitude is sufficient to originate crumbling or minute flaws, any unusual impact stress, or a stress in the direction opposite to that brought about by the usual rolling load, the rail may break into two or into numerous pieces. Stresses originating in the same manner explain the fracture of railway tires, as described fully by the author in the proceedings of the Institution of Civil Engineers, 1876, vol. xlvii.

The discussion on this paper was opened by Professor Unwin, who referred to the importance of the subject, but regretted that the author had supported his speculations on one fact, whereas the chief want was more facts. The paper said that failure of a rail depended on the number of trains that passed over it, and from this it would be argued that danger increased with age. In spite of this experience showed that most fractures occurred with new rails. Again, according to Mr. Beaumont's reasoning, soft rails would give way first, but again experience proved that hard rails were those which were the first to go. In his speculations the author had laid aside altogether the composition of the rail. He neglected fatigue and relied

upon the change produced by work tending to convert the rail from a homogeneous to a non-homogeneous material. An example bearing on this subject was found in the punching of steel plates, but that was produced by one part being put in tension, and the same thing was seen with rails. It was well known that tram rails when turned over were liable to break, but this would not explain the failure of railway rails, as they were not now turned over. Professor Unwin differed from the author in believing that the work done on the rail did not weaken but strengthened it, and he thought that the initial condition had far more influence than the rolling loads.

Mr. Johnson, of the Midland Railway, said he had had rails tested which had broken, and there was found to be no difference in composition in different parts. He also found steel rails in this respect much the same as those made of iron. The author had overlooked the fact that the joint between rails was imperfect, and the rails did not therefore form a continuous girder. The upper head of the rail was in tension, and the foot in compression. He thought that fractures often occurred through rails being made from ingots from which the pipe had not been removed.

Dr. Anderson pointed out that conditions analogous to those described by the author were observed on the bore of guns that had been fired a number of times. Little cracks were formed which divided the material up into small squares, and the rush of powder gases would break out these squares. The repetition of compression and release produced the effect described by the author, and he thought this showed an analogy between the treatment of the gun and that of the rail, for the wheels in passing caused sudden pressure and release of pressure accompanied by heating.

Professor Hele-Shaw referred to tests he had made for Mr. Johnson in regard to the physical conditions of rails, and said he had found no difference from whatever part the test pieces were taken.

Sir Douglas Fox said he had examined broken rails with the microscope and found they were covered by minute cracks. It was known that rails were more likely to give way near the end, but that might be due to insufficient cropping of the ingot, so that the piped part might not all be removed, and it might also be that the cracks would be accounted for by impurities in the steel not removed by cropping. The giving way might be facilitated by the cracks. Everyone knew how a piece of paper would tear with facility when the tear was once started. Prof. Hele-Shaw suggested that if the cracks were planed out this effect would be removed.

Mr. J. W. Anderson asked if any difference had been observed between the use of cross sleepers and longitudinal sleepers. This would be a point to be considered in connection with rails giving at the ends.

Mr. Beaumont, in reply to Professor Unwin's remarks, said that the matter he had put forward in the paper was not a question of speculation, but of fact. The reason, however, for the facts was obscure, but the question of fatigue mentioned by Professor Unwin was well known. Board of Trade inquiries were held when accidents happened, but he felt that something more should be done to arrive at a conclusion and permit of steps being taken to get over the difficulty. He therefore wrote his paper with a view to raise a discussion, and was obliged to those who had spoken and helped him towards that end. In regard to the point raised as to hard and soft rails, he could produce figures which would throw light on the problem, and sometimes a very hard rail would last longer than a soft one, although it would naturally break into a greater number of pieces when it did go. With regard to composition, naturally a rail must not be wrong in this respect. Professor Unwin had not grasped his meaning in that part of the paper in which he had referred to the turning over of rails. What Mr. Johnson had said in regard to iron rails supported his reasoning, as it showed the stresses referred to could not exist in a softer metal which could flow. Dr. Anderson's statement was also in support of his contentions. In regard to rails breaking at the ends, and the want of continuity between the different lengths of rail, it must be remembered that the modern stiff fishplates altered the stresses.

M. C. B. Rules of Interchange.

The secretary of the Master Car Builders' Association has sent out the following statement with regard to the revised rules of interchange of freight cars:

When the rules of interchange were revised in June, 1896, the arbitration committee was authorized by motion to make a ruling on questions arising and not settled by the rules, which ruling should stand thereafter as part of the rules for the year. The following subjects which have been brought to the attention of the committee by numerous parties, have been considered worthy of such ruling:

A. Because of the postal authorities becoming more strict in regard to the railway service mail, it has been suggested to the arbitration committee that the repair card stubs referred to in Sec. 16 of Rule 4, might be allowed to accompany the bills instead of being forwarded to the car owner on or before the twentieth day of each month. The arbitration committee sees no objection to the suggestion being followed unless some car owner insists that Sec. 16, Rule 4, be literally complied with.

B. Section 25 of Rule 5 is intended to protect car owners from loss by reason of damage done in switching cars, therefore switching roads are not allowed to render any bills for damage caused while cars are in their possession. It is not intended to prevent switching roads from rendering bill against their immediate connections for any re-

pairs of owners' defects which may be authorized by such connections when delivering the cars, and which existed upon the cars at the time of delivery. In such cases the delivering road must pay the bills of the switching road, and can only recover from car owners by certification on bills rendered by the delivering road against the owner, that these owner's defects never existed before the cars were delivered to the switching road.

C. Under the head of defects of wheels, a portion of Sec. (d) of Rule 3 of the rules for 1895 has been inadvertently omitted from the rules for 1896 and the following should be considered as a part of Rule 3, under the head of "Owners Responsible".

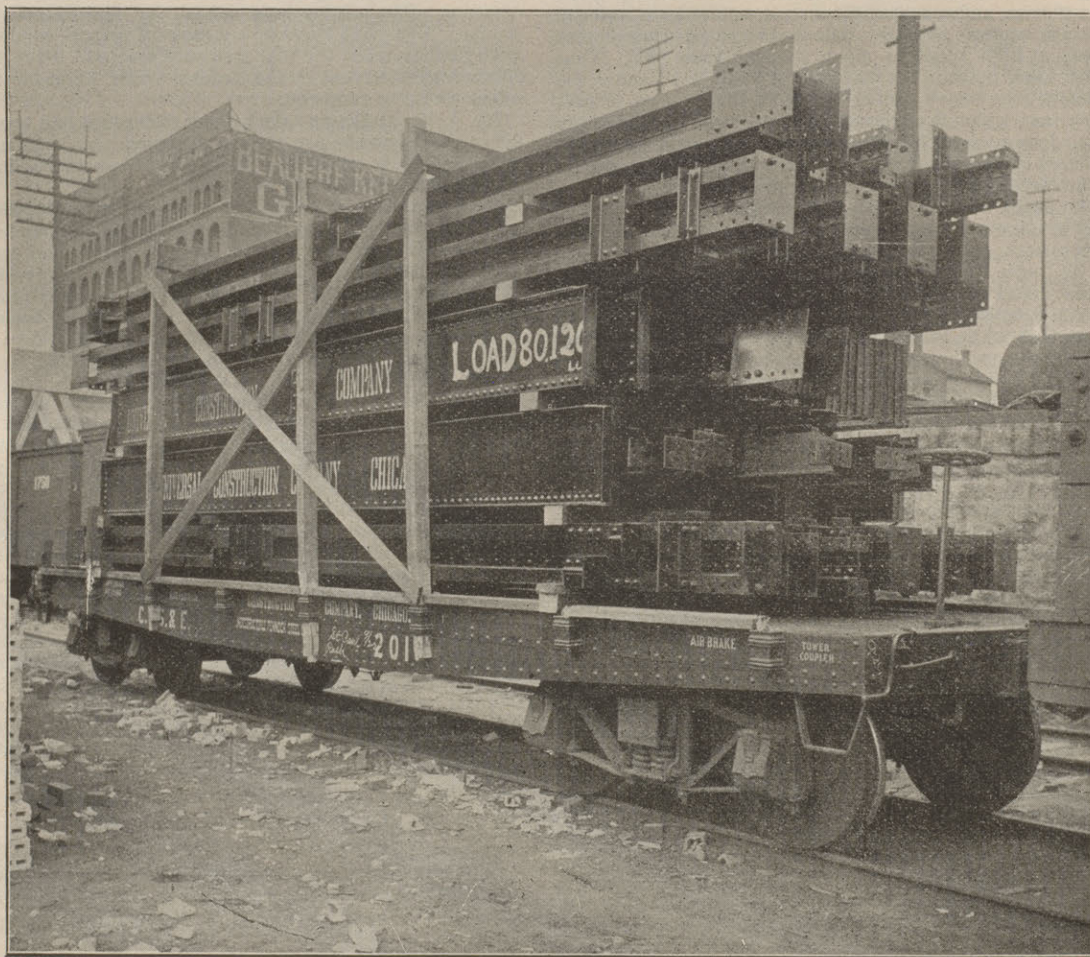
"Worn flange: flanges having flat vertical surfaces extending more than 1 in. from tread".

The method of measuring this by the wheel defect gage is too well known to require illustration here as it has been shown in all former additions of the rules of interchange.

D. No provision is made in the rules of interchange as to scrap credit for old brake shoes removed, and no provision is made for labor charges in renewing brake shoes. The arbitration committee therefore recommends that no credit be allowed for the scrap in such cases, and that no charge be made for the labor of renewing the shoes.

A HEAVY LOAD OF STRUCTURAL STEEL,

A practical test of the new Pennock flat cars, built by the Universal Construction Co. of Chicago was made September 22 in taking a load of structural steel, weight 80,120 lbs., from Chicago to St. Paul, Minn. The Universal Construction Co has the contract for the steel work for the Northern Pacific office building in St. Paul and the steel cars were very appropriately employed in transporting a portion of this material. The appearance of the car with its load in shown by the accompanying engraving. The train left Chicago at 8.45 p. m., September 22, over the Chicago & Northwestern Railway. Careful inspection on arrival showed that the car and its freight had traveled in perfect safety and good order, and as



A HEAVY LOAD OF STRUCTURAL.

the train referred to is one of the fast freight trains of the Northwestern Road and arrived at 2 a. m. on the 24th, showing that only 27½ hours were taken in transit, it is evident that this large and unique load did not in any way interfere with the usual, rapid movement of the train, and this speaks well for the construction of the car and trucks and also for the disposition of the forty tons of material which it carried.

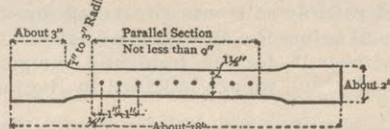
The Universal Construction Company is continuing its experiments and the development of the metal car. The company is just completing the construction of a modified form of flat car built on the Pennock plan, but somewhat simplified. The company is also operating gondola cars in the coal business, carrying from 68,000 to 75,000 lbs. at a trip, while the ore cars, (one of which was exhibited at Saratoga), are carrying from 78,000 to 89,000 lbs. at a trip. It is

stated that no weakness or defect has developed up to the present time in any of these cars, and the builders are so well pleased with the result of the experiments that they are bringing out further designs for refrigerator, stock and hopper cars, and have recently received inquiries from South America for equipment built on these lines.

STANDARD SPECIFICATIONS FOR STRUCTURAL STEEL.

The standard specifications covering the physical properties of structural and special open hearth steel plate and rivet steel, as adopted by the Association of American Steel Manufacturers, Aug. 9, 1895, have been revised as follows:

1. Steel may be made by either the open hearth or Bessemer process.
2. All tests and inspections shall be made at place of manufacture prior to shipment.
3. The tensile strength, limit of elasticity and ductility shall be determined from a standard test piece cut from the finished material. The standard shape of the test piece for sheared plates shall be as shown by the accompanying diagram.



On tests cut from other material the test piece may be either the same as for plates or it may be planed or turned parallel throughout its entire length. The elongation shall be measured on an original length of 8 in., except when the thickness of the finished material is 5-16 in. or less in which case the elongation shall be measured in a length equal to sixteen times the thickness; and except in rounds of ½ in. or less in diameter, in which case the elongation shall be measured in a length equal to eight times the diameter of section tested. Two test pieces

Physical properties.—8. Steel shall be of three grades, rivet, soft and medium.

Rivet Steel.—9. Ultimate strength, 48,000 to 58,000 lbs. per square inch; elastic limit, not less than one-half the ultimate strength; elongation 26 per cent; bending test, 180 deg. flat on itself, without fracture on outside of bent portion.

Soft Steel.—10. Ultimate strength, 52,000 to 62,000 lbs. per square inch; elastic limit not less than one-half the ultimate strength; elongation 25 per cent; bending test 180 deg. flat on itself, without fracture on outside of bent portion.

Medium Steel.—11. Ultimate strength, 60,000 to 70,000 lbs. per square inch; elastic limit, not less than one-half the ultimate strength; elongation, 22 per cent; bending test, 180 degrees to a diameter equal to thickness of piece tested, without fracture on outside of bent portion.

Pin Steel.—12. Pins made from either of the above mentioned grades of steel shall, on specimen test pieces cut at a depth of one inch from surface of finished material, fill the physical requirements of the grade of steel from which they are rolled, for ultimate strength, elastic limit and bending, but the required elongation shall be decreased 5 per cent.

Eye Bar Steel.—13. Eye bar material, 1½ in. and less in thickness, made of either of the above mentioned grades of steel, shall, on test pieces cut from finished material, fill the requirements of the grade of steel from which it is rolled. For thicknesses greater than 1½ in. there will be allowed a reduction in the percentage of elongation of 1 per cent for each ½ in. increase of thickness to a minimum of 20 per cent for medium steel and 22 per cent for soft steel.

Full Size Test of Steel Eye Bars.—14. Full size test of steel eye bars shall be required to show not less than 10 per cent. elongation in the body of the bar, and tensile strength not more than 5,000 lbs. below the minimum tensile strength required in specimen tests of the grade of steel from which they are rolled. The bars will be required to break in the body, but should a bar break in the head, but develop 10 per cent elongation and the ultimate strength specified, it shall not be cause for rejection, provided that not more than one-third of the total number of bars tested break in the head; otherwise the entire lot will be rejected.

Variation in Weight.—15. The variation in cross-section or weight of more than 2½ per cent from that specified will be sufficient cause for rejection, except in the case of sheared plates, which will be covered by the following permissible variations:

- a. Plates 12½ lbs. or heavier, when ordered to weight, shall not average more variation than 2½ per cent either above or below the theoretical weight.
- b. Plates from 10 to 12½ lbs., when ordered to weight, shall not average a greater variation than the following: Up to 75 in. wide, 2½ per cent either above or below the theoretical weight; 75 in. and over 5 per cent either above or below the theoretical weight.
- c. For all plates ordered to gage, there will be permitted an average excess of weight over that corresponding to the dimensions on the order equal in amount to that specified in the following table:

Table of Allowances for Overweight for Rectangular Plates When Ordered to Gauge.

The weight of 1 cubic inch of rolled steel is assumed to be 0.2833 pounds.

PLATES ¼ INCH AND OVER IN THICKNESS.

Thickness of plate, Inch.	Width of plate.		
	Up to 75 inches. Per cent.	75 to 100 inches. Per cent.	Over 100 inches. Per cent.
¼	10	14	18
5/16	8	12	16
3/8	7	10	13
7/16	6	8	10
1/2	5	7	9
5/8	4½	6½	8½
3/4	4	6	8
Over ¾	3½	5	6½

PLATES UNDER ¼ INCH IN THICKNESS.

Thickness of plate, Inch.	Width of plate.	
	Up to 50 inches. Per cent.	50 inches and above. Per cent.
1/16 up to 1/32	10	15
1/32 up to 1/16	8½	12½
1/16 up to 1/8	7	10

STRUCTURAL CAST IRON.

1. Except where chilled iron is specified, all castings shall be tough gray iron, free from injurious cold shuts or blow holes, true to pattern, and of a workmanlike finish. Sample pieces 1 in. square cast from the same heat of metal in sand molds, shall be capable of sustaining on a clear span of 4 ft. 8 in. a central load of 500 lbs. when tested in the rough bar.

SPECIAL OPEN HEARTH PLATE AND RIVET STEEL.

1. All tests and inspections shall be made at place of manufacture prior to shipment.
2. The tensile strength, limit of elasticity and ductility shall be determined by a standard test piece cut from the finished material. The standard shape of the test piece for sheared plates shall be as shown by the sketch above presented.

On tests cut from other material the test pieces may be either the same as for plates or it may be planed or turned parallel throughout its entire length. The elongation shall be measured on an original length of 8 in., except when the thickness of the finished material is 5-16 in. or less, in which case the elongation shall be measured in a length equal to sixteen times the thickness; and except in rounds of ½ in. or less in diameter, in which case the elongation shall be measured in a length equal to eight times the diameter of section tested. Four test pieces shall be taken from each melt of finished material, two for tension and two for bending.

3. Material which is to be used without annealing or further treatment is to be tested in the condition in which it comes from the rolls. When material is to be annealed

shall be taken from each melt or blow of finished material, one for tension and one for bending.

4. Material which is to be used without annealing or further treatment is to be tested in the condition in which it comes from the rolls. When material is to be annealed or otherwise treated before use, the specimen representing such material is to be similarly treated before testing.

5. Every finished piece of steel shall be stamped with the blow or melt number, and steel for pins shall have the blow or melt number stamped on the ends. Rivet and lacing steel and small pieces for pin plates and stiffeners may be shipped in bundles securely wrapped together with the blow or melt number on a metal tag attached.

6. Finished bars must be free from injurious seams, flaws or cracks, and have a workmanlike finish.

7. Steel for railway bridges, maximum phosphorus, 0.08 per cent; steel for buildings, train sheds, highway bridges and similar structures, maximum phosphorus, 0.10 per cent.

otherwise treated before use, the specimen representing such material is to be similarly treated before testing.

4. Every finished piece of steel shall be stamped with the melt number. Rivet steel may be shipped in bundles securely wired together, with the melt number on a metal tag attached.

5. All plates shall be free from surface defects and have a workmanlike finish.

Chemical properties.—6. In extra soft and fire-box steel the phosphorus must not exceed 0.04 per cent, and the sulphur must not exceed 0.04 per cent. For flange or boiler steel the maximum phosphorus is 0.06, and the maximum sulphur, 0.04 per cent. Steel for boiler rivets must not have more than 0.04 per cent of phosphorus and not over 0.04 per cent of sulphur.

Physical Properties.—7. Steel shall be of four grades—extra soft, fire box, flange or boiler, and boiler rivet steel.

Extra soft steel.—8. Ultimate strength 45,000 to 55,000 lbs. per square inch; elastic limit not less than one-half the ultimate strength; elongation, 28 per cent; cold and quench bends, 180 deg. flat on itself, without fracture on outside of bent portion.

Fire-box Steel.—9. Ultimate strength, 52,000 to 62,000 lbs. per square inch; elastic limit not less than one-half the ultimate strength; elongation 26 per cent; cold and quench bends, 180 deg. flat on itself, without fracture on outside of bent portion.

Flange or Boiler Steel.—10. Ultimate strength, 52,000 to 62,000 lbs. per square inch; elastic limit not less than one-half the ultimate strength; elongation, 25 per cent; cold and quench bends, 180 deg. flat on itself, without fracture on outside of bent portion.

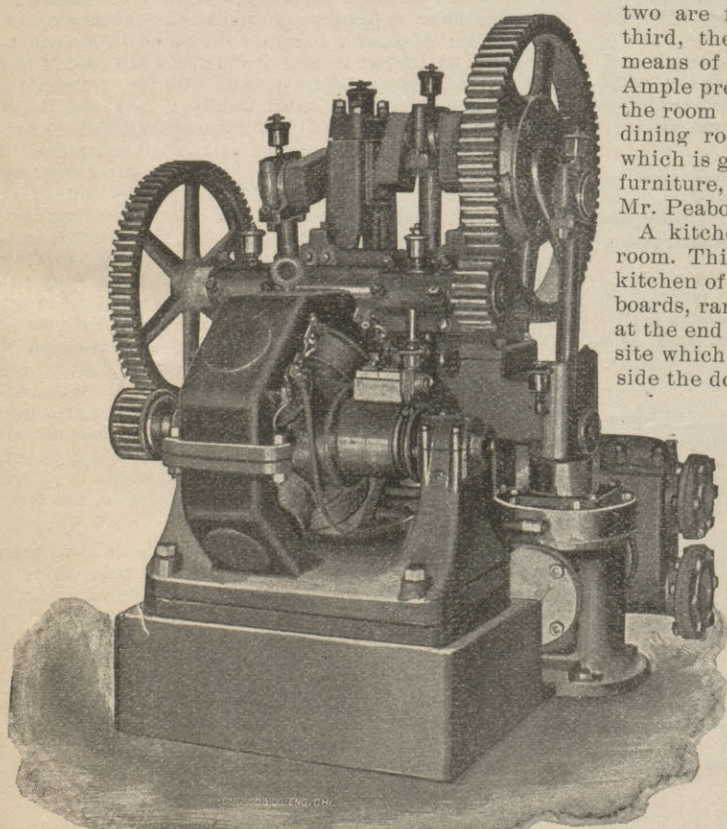
Boiler Rivet Steel.—11. Steel for boiler rivets shall be made of the extra soft quality specified in paragraph No. 8.

Variation in Gage.—12. For all plates ordered to gage there will be permitted an average excess of weight over that corresponding to the dimensions on the order equal in amount to that specified in the following table, provided no plate shall be rejected for light gage measuring 0.01 in. or less below the ordered thickness:

Variation in Weight.—13. Plates $12\frac{1}{2}$ lbs. or heavier when ordered to weight shall not average more variation than $2\frac{1}{2}$ per cent either above or below the theoretical weight. Plates from 10 to $12\frac{1}{2}$ lbs., when ordered to weight shall not average a greater variation than the following: Up to 75 in. wide, $2\frac{1}{2}$ per cent either above or below the theoretical weight; 75 in. and over 5 per cent either above or below the theoretical weight.

TRIPLEX ELECTRIC PUMP.

The accompanying illustration is reproduced from a photograph of a new electric pump which has been placed upon the market by Messrs. Henion & Hubbell, 61 North Jefferson street, Chicago. The pump is designed to work against a pressure of 150 lbs. per square inch, and is fitted with steel crank shafts, cut gears, ample bearings, outside packed plungers, large valve areas, and is in every way equipped for very heavy duty. The pump is specially adapted for hydraulic elevators, water works and refinery and mine services, and any similar duty which requires a large volume of water at a high and uniform pressure, the triplex cylinders being specially adapted to give a uniform and continuous pressure. The electric motor, as can be seen by the illustration, is coupled directly to the pump and secured to the same base plate. The motor pinion is



TRIPLEX ELECTRIC PUMP.

of raw hide in order to reduce the amount of noise to a minimum. The pumps are manufactured in five different sizes varying in capacity from 59 to 354 gal. per minute. This is a very good illustration of one of the many uses to which electricity is now being applied and there are undoubtedly a large number of points at which electric power can be transferred at a much less cost than steam and in such places a pump of this nature can be used to excellent advantage.

PHOTOGRAPHER'S CAR—BOSTON & MAINE RAILROAD.

The Boston & Maine Railroad Company has this season inaugurated a new departure and one that cannot fail to add to its passenger travel. It is the equipment of a new car for photographing the many bits of beautiful scenery on its lines and those of the Maine Central. The choicest of these scenes will be used in the folders and other advertisements of the road. This car will be stopped at any desired point, and photographing excursions will be made to interesting places off the company's lines. The first trip of this car was made in August. It is known as car No. 159 and is under the charge of the well known photographer, Henry C. Peabody, of Boston.

The journey was begun with a trip through central Massachusetts, then along the valley of the Connecticut, to and along the Lake Champlain, across the Green Mountains, through the Franconia and White Mountain region, the Dixville Notch and Lake Winnepesaukee. From Portland east a tour will be made along the Maine coast to Bar Harbor and Mount Desert Island, thence north through the



PHOTOGRAPHIC CAR—BOSTON & MAINE RAILROAD.

big game region of Aroostook county and the Moosehead region, thence through the Rangeley Lakes, including a tour over the entire Boston & Maine, Maine Central and Bangor & Aroostook railroads.

This is a reconstructed passenger car, from which the seats have been removed and which has been refitted for the special use to which it is to be put. Entering the car a sitting room 12 ft. long and the full width of the car is found. The room is supplied with lounge, desk, bookcase and other furniture and a heater, the pipes of which heat the other apartments of the car. Next comes a stateroom eight feet in length, with two berths, one above the other, and the usual toilet conveniences. The dark room is nine feet in length, and is supplied with a large sink and ample drawers, shelves and other storage facilities. Overhead are two iron tanks, each holding 45 gallons of water. A third tank of the same size over the kitchen provides a further supply when needed. Of the three windows in the dark room two are fitted with panes of ruby glass, and the third, the middle one, with a movable panel, by means of which air or daylight may be admitted. Ample provision has been made for ventilation when the room is in use. Beyond the dark room is the dining room, nine feet in length, the entrance to which is guarded by portieres. Besides the usual furniture, this room contains two folding berths for Mr. Peabody's assistants.

A kitchen nine feet in length is next to the dining room. This has every convenience with which the kitchen of a modern dining car is supplied—cupboards, range, sink, water tank, etc. Just beyond, at the end of the car, is a large refrigerator, opposite which is the toilet room. On the platform outside the door is a box for fuel. The party, besides

Mr. Peabody, includes his wife and little daughter, a photographic assistant, Mr. Frederick Lord, son of Prof. Lord, of Dartmouth, and a chef. They will spend four or five months on the trip, the car being moved from point to point as Mr. Peabody may direct, and remain side-tracked while he is prosecuting his work with the camera.

The efforts being made to effect a reorganization of the roads in the territory west of Chicago is likely to prove successful. Railroad earnings are too vital a matter to be ignored at the present time. The best obtainable scale of revenue is too low at best, and to reduce it unnecessarily is a step toward commercial suicide.

A STRONG PASSENGER CAR.

In the RAILWAY REVIEW of September 12 of the current volume a brief description was given of an interesting accident which occurred at a washout near Otis Ind., on the Lake Shore & Michigan Southern Railway. The illustration in the article referred to, shows a passenger coach extending across an opening in an embankment where it was supported in such a way as to bring the weight of the car upon very nearly its extreme ends. It is evident that the strain upon the floor system of the car would be considerable under these circumstances and that to withstand such usage without serious damage, strong construction would be required.

In this connection Mr. A. M. Waitt, general master car builder of the road, states that with all the rough usage that the car received, in going through the washout and in being rolled completely over once, in moving it out of the way of the temporary track, and in hauling it up on the main track again, the damage amounted to a total of but \$400. Under the peculiar circumstances surrounding this accident, such a low amount of damage is certainly remarkable. A large part of the damage consisted in tearing off the truss rods, the brake rigging, and the gas attachments from the under side of the car. The body, frame, and ends of the car, aside from the platforms, were not strained or started in any way. The car was taken to the shops with the truss rods gone, and was found on its arrival at shop to be in as good shape, as far as trussing and alignment was concerned, as it was when first built.

This car was built in a way to make it telescope proof. Probably no stronger coaches are running to-

day in the country than this, the side sills being in a sandwiched form with an iron plate between, the end sills also being of similar construction, and the end framing of the car being re-inforced with iron plates at the side of each corner post, each door post and intermediate post. From the belt rail to the side sill, the entire length of the car, let in about one-half inch into the posts is a filling three-quarter inch thick composed of two wide pine planks, glued and screwed to the posts, properly blocked on the inside. To this filling the paneling is securely glued. The car is furnished inside with the old-fashioned truss plank. There was no bracing aside from this in the side framing. This construction enabled the car to stand the severe straining apparently without the starting of a single joint, which is an excellent recommendation for this or similar construction. An ordinary car would probably require complete overhauling after such a wreck.

RAILWAY DEVELOPMENT OF INDIA.

The latest report of the East Indian Railways indicates that an era of commercial progress has already commenced in that country. The marked increase of traffic on existing lines and the probable pushing of projected lines all seem to point toward a rapid development of the large areas of country as yet untouched by trade. Referring to this matter Engineering of London says:

The works sanctioned and in progress total 23,466 miles, of which 13,373 miles are of standard gage. Perhaps the most extensive is the Southern Punjab line, which extends through country well irrigated from Delhi to Samasata, a distance of 400 $\frac{1}{4}$ miles, with one river crossing of importance, at Ghaggar, where a 20-span bridge of 40 ft. long girders is being put up. It is destined to save a long detour by Lahore for troops and goods going to Kurrachee, which is so rapidly becoming the foremost western port of our eastern dependency. At the same time a further loop of the meter gage line from Pachpadra to Khokarpar is being exploited, and only some 80 miles will remain to complete this alternative route from Delhi to the same port. During the year 136 miles of the east coast route from Madras to Calcutta were opened. The section of 254 miles from Madras to Bezwada is in progress of construction, and there is every prospect of the remaining 300 miles, which includes heavy bridge work, being carried forward simultaneously. But as we have said already, there is great room for short feeder lines to develop the agricultural areas. The lines making for the China frontier are also being pushed forward rapidly. The line from Chittagong to Feni, thence to Comilla and on to Akhaura, in all 125 miles, has been opened for traffic, and it is expected that the line for 128 miles further north—to Badarpur—will be opened next month. The railway from Rangoon parallel to the Irawaddy has now been completed as

far as Mogaung, 151 miles having been opened during the year; an additional length of 37 miles has been started and will carry the railway to another tributary of the Irrawaddy at Myit Kyina—nearly 700 miles up country from Rangoon. The branch from Mandalay to Kuntun Ferry, which will also ultimately tap the rich district of Yunnan, has been started, and Lord Salisbury has promised his aid in the work of making an entrance to this extensive market.

A GOOD BOILER TEST.

The Brightman Furnace Company of Cleveland, Ohio, has been given an order by the city of Cleveland for four Brightman mechanical stokers for use under a battery of four 78 in. x 18 ft. tubular boilers to be put in the city water works. The furnace company, in addition to the stokers, will furnish all masonry in the boiler settings, the boiler fronts and a spiral ash conveyor over 50 ft. in length. Before placing the order a careful test was made of some of the Brightman stokers, which were put under a battery of boilers in the works of the Cleveland Paper Company in 1892. The test was made of two of the boilers, which were 66 in. in diameter and 16 ft. long. No special preparation was made for the test, and it was conducted during the regular operation of the mill. As the absence of smoke is one of the important requisites, a series of photographs of the stack was taken during the test, ten negatives being taken per hour. The following is a copy of the report as given by Mr. Charles Goffing, mechanical engineer for the Cleveland city water works department:

Date of test	Sept. 17, 1896
Duration of test	8 hrs
Coal consumed (slack)	6270 lbs
Coal consumed per boiler per hour	391.9 lbs
Ashes and refuse	776 lbs
Per cent of ashes	12.4
Weight of combustible	5494 lbs
Average temperature of feed water	193.9 deg. Fahr
Av. temp. of water pumped through meter	128.4 deg. Fahr
Av. steam pressure	91.94 lbs
Meter registered	960
Meter registered per cubic foot	1.02
Cubic feet of water fed	941.18
Weight of 1 cu. ft. of water at temp. 123 deg. F.	61.59 lbs
Weight of water evaporated	57,967.3 lbs
Factor of evaporation	1.0569
Eq. wt. of water from and at 212 deg. Fahr.	61265.6 lbs
Lb. of water evaporated per lb. of coal from and at 212 deg. Fahr.	9.77 lbs
Lbs. of water evap. per lb. of coal (actual)	9.24 lbs
Lbs. of water evap. per lb. of combustible from and at 212 deg. Fahr.	11.11 lbs
Lbs. of water evap. per lb. of combustible (actual)	10.55 lbs
Horse power (Centennial standard)	222
Horse power per boiler	111

The chimney was smokeless during the entire run, excepting four or five times when the air spaces in grates were cleaned, when a light gray smoke was emitted for about eight minutes. The coal was Youghiougheny slack, the same as is furnished to the water works.

TECHNICAL MEETINGS.

The Technical Society of the Pacific Coast has a monthly meeting on the first Friday in each month at 8 p. m., at the Academy of Sciences building, 819 Market street, San Francisco, Cal.

The Engineers' Club of Cincinnati has a monthly meeting on the third Thursday in each month, at 7:30 p. m. at the Literary Club, 24 West Fourth street, Cincinnati, O. Address P. O. Box 333.

The Engineers' Club of Minneapolis holds its meetings on the first Thursday in each month, at Public Library building, Minneapolis, Minn.

The Engineers' Club of Philadelphia meets on the first and third Saturdays in each month, at 8 p. m., at the house of the club, 1122 Girard street, Philadelphia, Pa.

The Civil Engineers' Club of Cleveland meets on the second and fourth Tuesdays in each month, at 8 p. m., at the Case Library building, Cleveland, Ohio.

The Association of Engineers of Virginia, holds its in formal meetings on the third Wednesday of each month from September to May inclusive, at 8 p. m., at 710 Terry building, Roanoke, Va.

The Western Railway Club of Chicago, holds its meeting on the third Tuesday of each month.

The Central Railway Club meets on the second Friday of January, March, May, September and October, at 2 p. m., at the Hotel Iroquois, Buffalo, N. Y.

The Denver Society of Civil Engineers meets on the second and fourth Tuesdays in each month except July, August and December, when they are held on the second Tuesday only, at 36 Jacobson building, Denver, Colo.

The Western Society of Engineers holds its regular meetings for the transaction of business and the reading and discussion of papers on the first Wednesday of each month except January.

The American Society of Civil Engineers holds meetings on the first and third Wednesdays in each month, at 8 p. m., at the House of the Society, 127 East Twenty-third street New York City.

The Association of Civil Engineers of Cornell University meets weekly every Friday, from October to May inclusive, at 2:30 p. m., at Lincoln Hall, New York.

The Boston Society of Civil Engineers, meets monthly on the third Wednesday in each month, at 7:30 p. m., at Wesleyan Hall, 36 Bromfield street, Boston, Mass.

The Canadian Society of Civil Engineers meets every other Thursday at 8 p. m., at 112 Mansfield street, Montreal, P. Q.

The Foundrymen's Association meets monthly on the first Wednesday of each month, at the Manufacturers' Club, Philadelphia, Pa.

The Montana Society of Civil Engineers meets monthly on the third Saturday in each month, at 7:30 p. m., at Helena, Mont.

The New England Railroad Club meets on the second Tuesday of each month, at Wesleyan Hall, Bromfield street, Boston, Mass.

The New York Railroad Club has a monthly meeting on the third Thursday in each month, at 8 p. m., at 12 West thirty-first street, New York City.

The Northwestern Track and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m., at the St. Paul Union Station, St. Paul, Minn.

North-West Railway Club meets alternately at the West Hotel, Minneapolis, and the Ryan House, St. Paul, on the second Tuesday of each month.

The Engineering Association of the South meets on the second Thursday of each month at 8 p. m., at the Cumber and Publishing House, Nashville, Tenn.

The Railway Signaling Club holds its meetings in Chicago, Ill., on the second Tuesday of January, March, May, September and November. G. M. Basford, secretary, 818 The Rookery.

The Southern & Southwestern Railway Club holds its meetings on the third Thursday of January, April, August and November, at the Kimball House, Atlanta, Ga.

The Western Foundrymen's Association holds its meetings on the third Wednesday in each month, at the Great Northern Hotel, Chicago, Ill.; secretary, A. Sorge, Jr., 1533 Marquette building.

PERSONAL.

Mr. W. A. Wolford, in charge of the Big Four shops at Bellefontaine, formerly at the shops in Wabash, has resigned on account of ill-health.

Mr. J. T. Wann has been appointed auditor of the Erie despatch, with headquarters in New York.

Mr. Thomas Purdy has been appointed agent of the Pennsylvania Long Branch district, to succeed Mr. B. Courlaender, transferred to the Baltimore district.

Mr. J. D. McCubbin, Jr., has received the appointment of real estate agent for the Baltimore & Ohio for all lines east of the Ohio river. The position is considered an important one.

Mr. Benjamin Bryant has been appointed contracting agent of the Georgia & Alabama, with headquarters at Louisville, Ky. Mr. Bryant was formerly with the Louisville, New Albany & Chicago.

Mr. S. S. Whitehead, for several years past general freight agent of the Indiana, Illinois & Iowa Railroad, has resigned to accept the position of traffic manager of the Chicago, Hammond & Western Railroad.

Mr. John W. Fortune, who recently resigned as assistant to General Manager Spicer, on the Grand Trunk, has been appointed confidential adviser of Mr. H. B. Ledyard, president of the Michigan Central.

Mr. James S. Leahy has been appointed general southern and western agent of the Cincinnati, Hamilton & Dayton, with headquarters at Cincinnati, in charge of business originating in Cincinnati and east of the Mississippi river.

Mr. Robert L. Harris, an old and prominent member of the American Society of Civil Engineers and of the Institution of Civil Engineers of Great Britain, died suddenly of apoplexy, Thursday, October 1, at Kearsarge Village, N. H.

Mr. A. J. O'Reilly, commercial agent at Indianapolis, has been appointed general agent of the Louisville, New Albany & Chicago, with jurisdiction over all matters pertaining to the operating department at Indianapolis in addition to his present duties.

On October 1 Mr. F. E. Basier assumed the position of general freight and passenger agent of the Indiana & Illinois Southern, with headquarters at Sullivan, Ind., vice Mr. C. P. Walker, general freight agent, and Mr. M. D. Crowley, general passenger agent, transferred.

Mr. Harry C. Fuller, formerly general agent of the passenger and freight departments of the Wisconsin Central, died of paralysis on Tuesday, September 26, at Lake Geneva, Wis. He began his railroad career on the Chicago, Milwaukee & St. Paul in 1877, as a messenger boy.

Mr. Henry Graham, chairman of the Peoria committee of the Central Traffic Association, has tendered his resignation, his transfer to Indianapolis compelling him to retire, his new position as assistant general freight agent of the Lake Erie & Western having largely increased his duties.

A circular has been issued confirming the appointment of Mr. John L. Wigton as master car builder of the Missouri, Kansas & Texas for the lines north of Denison, Tex., with headquarters at Sedalia, Mo., and Mr. W. M. Brehm will hold the position of master mechanic for the same territory, with headquarters at Parsons, Kas.

Assistant General Superintendent Gilleas of the Illinois Central has appointed Mr. A. Philbrick to the roadmaster-ship of the Thirteenth road division, Grenada to Memphis

and Memphis to Paducah, with office at Memphis, where Mr. A. T. Sabin will hereafter be roadmaster of Tenth road division, with office at Louisville. Both appointments became effective on Oct. 1.

At the annual meeting of the Minneapolis & St. Louis stockholders held Oct. 6, Messrs. C. S. Mellen of New Haven, Conn., Edwin Langdon and George Crocker were elected directors to succeed the retiring members, Messrs. W. A. Read, August Belmont, W. L. Bull and C. C. Cuyler of New York. The directors elected Edwin Hawley of New York president, to succeed W. L. Bull, resigned. The active management remains unchanged.

Mr. Ross Mackenzie, general manager and purchasing agent for the Niagara Falls Park & River Railway, has resigned that position to go to Montreal to take service with the Canadian Pacific. Mr. Mackenzie is one of the well known railway men of Canada, and before he leaves his Niagara Falls friends will tender him a farewell banquet. He will be succeeded by Mr. Wilfred Phillips, who has for the last three years been head electrician of the road.

It is reported that Mr. W. H. Stark will resign his position as master car builder of the Wheeling & Lake Erie Railway Company to give his attention to the railway supply business. Mr. Stark has an interest in several valuable railway appliances which will probably be placed on the market in the near future. It is said also that the car and locomotive departments of the Wheeling will be consolidated and Master Mechanic Dunbar's authority extended to cover both.

Prince Michael Hilko, imperial minister of ways and communication of Russia, a detailed sketch of whose life was given in these pages last week, has reached this country, having arrived at San Francisco on the steamer Belgic on the afternoon of Oct. 7. The Prince left for the east the same evening, and will be in Chicago, October 13. He will come from Kansas City via the Atchison, Topeka & Santa Fe, stopping to inspect the Drainage Canal before reaching the city. In the afternoon he will go to Pullman and leave in the evening for Cincinnati.

Mr. George P. Lyman, chief clerk of the freight department of the Chicago, Burlington & Northern, has been appointed general passenger agent of that road, vice Mr. W. J. C. Kenyon, who will hereafter devote himself entirely to the freight department. Mr. Lyman has been with the Burlington for many years, the past nine years being chief clerk in the office of the general freight and passenger agent. Before going to St. Paul he was with the Burlington at Rock Island and East St. Louis and is a well known roadrunner.

Announcement is made of the appointment of Mr. F. W. Brazier to the position of assistant superintendent of machinery of the Illinois Central road. Mr. Brazier was formerly with the Fitchburg, where he held the office of general foreman under Mr. Marden, and came west to take charge of the repair work of the Chicago, New York & Boston Refrigerator Company, and was located at Elsdon, Ill. After three years' service in this capacity, he accepted the position of general foreman of car works with the Illinois Central, which position he now leaves. Mr. Brazier will have immediate charge of the car department under Mr. Renshaw, and his office will be at the Park Row Station, Chicago.

RAILWAY NEWS.

Baltimore & Lehigh—York Southern.—As early as last May negotiations were in progress for the consolidation of the Baltimore & Lehigh and the York Southern roads, and now Mr. Alexander Brown, chairman of the committee having the matter in charge and also a director of the B. & L. road, has received a definite offer for the consolidation. The proposition substantially is that the Baltimore & Lehigh shall broaden its present line from Baltimore to Delta, Pa., where connection shall be made with the York Southern. This would make a connecting link from York, Pa., to Baltimore, Md., by way of Delta, Pa., and Belair, Hartford county, Md. The York Southern ends abruptly at Delta, in the rich slate regions. All traffic for Baltimore over that road must be taken to York and brought in over the Northern Central R., a very circuitous route. The York Southern is determined to get a route through to Baltimore other than the one now in use, and plans have been considered for the extension of its line from Delta to Belair and on to Magnolia, where connection would be made with the Philadelphia, Wilmington & Baltimore R. It is said, however, that the proposed conditions are not entirely satisfactory to the committee and will have to be modified before the deal is completed. As the Pennsylvania R. Co. practically controls the York Southern it is believed that the proposition comes from that source.

Belleville & Southern Illinois.—Arrangements have been made by the Belleville & Southern Illinois road whereby an extension of time has been granted for the payment of the principal of the first mortgage 8 per cent currency bonds for one year from October 1, 1896, with interest at the rate of 4½ per cent, payable semi-annually in gold coin. The payment of the principal and interest of the bonds so extended will be guaranteed by the Illinois Central R. Co. Bondholders not assenting to such extension can receive, on and after October 1, principal and accrued interest upon application at the office of the Illinois Central R. Co. and surrender of bonds and coupons.

Butters Lumber Co.—The new line which is being built in Columbus county, N. C., by the Butters Lumber Co. is about completed and the rolling stock has been purchased.

The railroad, which is to be twelve miles long, will be used for hauling timber from Fair Bluff and vicinity to Hub, where the lumber company has its mills located. Fair Bluff is also located on navigable water, and dressed lumber or logs can be shipped to the coast in tows or barges.

Chicago & Alton.—As has been reported heretofore, the Chicago & Alton are about to build its tracks into Peoria, Ill., a distance of 12 miles. For several weeks past surveys have been in progress and it is now expected that graders will commence work in a few days' that the new line may be finished before cold weather. For the last few months the company has been running its trains into Peoria from Washington over the Toledo, Peoria & Warsaw.

Cincinnati, Union & Chicago.—The sale of the Cincinnati, Union & Chicago R., which is partially completed, has been ordered for October 31, to take place at Wabash, Ind. There are claims for labor and material aggregating a large sum, one for \$28,000 having just passed into the hands of John Bliss and F. W. Short of Chicago. These gentlemen are endeavoring to organize the company and proceed with the work, and to this end have obtained judgment and a decree of sale on their mortgages.

Detroit, Lansing & Northern.—It is announced that the date of sale for the Detroit, Lansing & Northern road has been set for Oct. 20.

Harriman & Northeastern.—Preliminary surveys have been made for an extension to the Harriman & Northeastern to run from Petros Station to Jellico to connect with the Louisville & Nashville. The line proposed would be 50 miles long and would necessitate one tunnel of 1,440 ft. Another extension 14 miles long to the state coal mines is also being talked of. Mr. G. W. Chandler of Harriman, Tenn., is president and general manager of the Harriman & Northeastern.

Hutchinson & Southern.—The work of grading the Hutchinson & Southern extension was completed as far south as Wakita, Grant county, October 3, and tracklaying began the next day. Three towns are named as the point at which this road will intersect the Rock Island, namely, Pond Creek, Medford and Enid, distant, 14 miles, 13 miles and 30 miles, respectively, from Wakita, but no decision has yet been made. A large force of men is now at work and it is expected to finish the work before winter.

Kings County.—All work of reorganization of the Kings County road is at a standstill owing to the illness of General James Jourdan, the lately appointed receiver of the line. The work on the Long Island extension has been delayed by the failure of the iron to arrive. The Phoenix Bridge people have erected their workshop at the city line, and are only waiting the arrival of the iron to start in. The work will probably be resumed soon. Work is now progressing at Jamaica and Hempstead, and part of the road to Far Rockaway is under way. The Hempstead part of the work will undoubtedly be finished before the new year, but the road to Far Rockaway will not be finished until spring. The road is now running as far as Jamaica. The complete connection of the Long Island road with that of the Kings County Co. will not be made, however, until the incline is built at the city line. Then the cars of the Long Island Co. will run up the incline to the tracks of the elevated railroad.

Lake Manitoba Ry. & Canal Co.—A new road is being built from Gladstone to Lake Winnipegosis, a distance of 125 miles, and is to be called the Lake Manitoba Ry. & Canal Co. Work of all kinds is in progress, such as grading, tracklaying, building of station houses and water tanks and bridges, all of which are under contract to McKenzie, Mann & McKenzie of Toronto and Montreal. The grading is now completed to within 25 miles of Lake Winnipegosis, and more than 50 miles of track are already laid. The following are the officers of the road: Frederic Nicholls, president, Toronto, Ont.; James Gunn, vice president; Chas. E. L. Porteous, secretary and treasurer, Portage la Prairie, Man.; and Thomas H. White is chief engineer.

Marietta & North Georgia.—The syndicate which bought the Marietta & North Georgia Railroad will make another payment of \$100,000 November 1, and will take the property out of the hands of the receivers who were appointed by the court to take charge of the property. They will then begin immediate reorganization, having full possession. It is expected that President McHarr, of the Manhattan bank, New York, will be elected president of the new company.

New Orleans & Northeastern.—That portion of the Queen & Crescent route extending from New Orleans to Meridian, Miss., has been making some improvements all along the line lately, and it is understood that still more extensive improvements are to be inaugurated. A year or two ago, after the great storms, when the Northeastern, as well as all the roads, suffered so much, the company decided to have as much of the trestling work filled up as possible. This work was started, but was never carried out upon any very extensive scale. But now the company has determined upon doing a great deal of this work. It is not expected that much headway will be made at once, or even during the winter season, as there is more or less business moving, but all the preparations are being made and work will be started as soon as possible. In the annual report issued a few days ago, the Northeastern shows an increase in passenger profits over last year of over \$12,000, while in freight there has been several times as much increase over last year's business. It would seem that the Northeastern road is under most excellent management else such favorable showings would not be made.

New York, New Haven & Hartford.—The Old Colony R., which is a part of the New York, New Haven & Hartford system, held its annual meeting of stockholders on Sept. 29. The stockholders authorized the issue of \$3,000,000 in bonds, in accordance with the recommendation of the directors. The stockholders also approved an agreement for consolidation with the Fall River R. Co. The Old Colony owns substantially all the stock of this company, and all the bonds are owned by the New York, New Haven & Hartford R. Co. The old board of directors was re-elected by 13,001 votes. President Choate said with reference to the new issue of bonds voted by the stockholders that of the authorized issue of \$2,000,000 bonds last year, \$750,000 was still held, as it had been deemed inadvisable to put the bonds out during the year. About \$750,000 had been borrowed to take up bonds maturing. Of the \$3,000,000 issue just voted, \$2,400,000 will be used in taking up maturing bonds and \$600,000 will be expended for improvements.

Ogdensburg & Lake Champlain.—It has been decided by Judge McLennan in special term of court that a temporary receiver shall be appointed for the Ogdensburg & Lake Champlain road pending the final determination of the suit brought by the state. The company tried to show that its assets and liabilities balanced at \$8,301,807, but the court thought that the equipment of the road could not be regarded as an asset, as it had been leased to the Central Vermont Co. He thought the only asset was the revenue derived by the Ogdensburg & Lake Champlain Co., and that case of insolvency had been shown against the road.

Queen Anne's.—The Queen Anne's road is now completed from Queenstown to Denton, Md., but no trains will be put on until the long bridge over the Choptank river at Denton is finished, which is now about one-third completed. The 15 miles from Denton to Greenwood del., is all graded and more than 10 miles of rails laid. No work has been done on the Lewes end, delay having been occasioned in regard to the crossing with the Pennsylvania. The charter of the Queen Anne's R. gives the new line the right to cross the Pennsylvania tracks at grade, overhead, or underneath. It is proposed to cross at grade, but the necessary agreement has not been reached, and the matter may have to go to the courts for settlement. Mr. W. H. Bosley, at Baltimore, is president of the construction company.

St. Louis Southwestern.—Extensive improvements are being made along the line of the Cotton Belt between Pittsburg and Mount Pleasant. The track is being raised from four to seven feet and the old bridges are being replaced by new ones. Grading on the shop ground at Tyler is partially completed under Captain Hughes of Fort Worth, but the force is now at work in Cypress Bottom, constructing two miles of track for which he also has the contract. This portion of the road has in the past been a source of much inconvenience to the company's traffic, especially during the spring freshets.

San Francisco & San Joaquin Valley.—The San Francisco & San Joaquin Valley R. is now completed into Fresno and was formally opened for passenger traffic between that city and Stockton on Monday, October 5, by Governor Budd in the presence of 30,000 people from all the towns of Central California. At noon there was a civic and military parade, followed by a barbeque.

Sunbury & Lewistown.—At a special meeting of the stockholders of the Sunbury & Lewistown R. it was voted to merge that road with the Mifflin & Centre County. The plan is to cancel the present capital stock of the Sunbury & Lewistown R., which amounts to \$600,000, and to issue \$1,200,000 of new capital stock, \$800,000 of which is to be given pro rata to the present stockholders of the Sunbury & Lewistown R. Co., the remaining \$400,000 to be paid to the Pennsylvania R. in exchange for the total bonds (\$200,000), and the total stock (\$200,000) of the Mifflin & Centre County R. Co. The acquisition by the Pennsylvania R. Co. of one-third of the capital stock of the Sunbury & Lewistown promises to make a bright future for the latter. The Mifflin & Centre County R. earns 6 per cent on its stocks and bonds, and gives the Sunbury & Lewistown R. good terminals, of which it is much in need.

Toledo, St. Louis & Kansas City.—It is thought that the prospects now are that a reorganization of the Toledo, St. Louis & Kansas City R. Co. is far in the future. The fight is being made by the preferred stockholders who desire to come into reorganization separate from the common stockholders. They claim that the interests of the common and preferred stock are diverse. Mr. C. P. Huntington controls the common stock, while between \$1,500,000 and \$2,000,000 preferred stock out of \$5,805,000 outstanding is held in Boston. Some time ago it was decided by Judge Ricks that the preferred stock of this road did not constitute a lien on the property. This stock was issued to take over the bonds of the roads which went to make up the Toledo, St. Louis & Kansas City R. at the time of its organization in 1886. An appeal has been taken from this decision and a hearing was to have been held in Ohio on the 6th inst., but it was postponed. Until this case is out of the way no organization can be effected, although the first mortgage bondholders will attempt to secure a decree of foreclosure of the road this month. They made application last May but were unsuccessful and matter went over to the October court.

NEW ROADS AND PROJECTS.

Colorado.—A project organized some years ago by the late "Brick" Pomeroy and which was actually begun at that time is now in difficulties and it seems likely that it

will now never be completed. This was the Atlantic & Pacific Railway Tunnel Co., and the scheme was to construct a tunnel five miles long through a ridge of the Rocky Mountains in Colorado, for the combined purpose of tapping alleged great deposits of gold and other ores, and of opening a short line of railway communication which would cut down the distance between Denver and Salt Lake City from 770 to 520 miles. The company was organized in 1880, and work went on slowly for some years, but at present only about 1½ miles of tunnel are completed, and this tunnel is, it is understood, only a heading, and not of full sized section for railway purposes. The project was most extensively advertised and a large aggregate amount was subscribed, mainly by small investors. No work has been done for some two or three years, and it is now claimed that, owing to non-payment of taxes by the officers of the company, the property is liable to be sold to recover the amount of the taxes.

Maine.—It is said that the settlement of the right of way for the Woodstock & Centerville R. is all that prevents the immediate work of construction all along the line. Eighty Italians were set to work in the vicinity of Centerville last week. At the Woodstock end of the line it is desired to employ local laborers, and it is proposed to trade with the farmers along the line as much as possible. Next week it is expected that the work will be actively under way; it is intended to arrange the work so that rock cutting, where such is found necessary, can be proceeded with in the winter; that will be in places where heavy drifts will not interfere. Shanties have been erected, it is said, and houses secured for the shelter of the workmen.

Michigan.—The St. Joseph Valley road is progressing as the company is working teams for the bed of the road at the harbor and has ordered steam shovels, etc. Five miles of the bed is already prepared between the village and its terminus. It is said there is little doubt that the new line will be completed from Buchanan to Benton Harbor.

A report is out that Mr. Wellington R. Burt has been quietly buying property between the Michigan Central and Lake Shore roads between Toledo, O., and Detroit, Mich., and that in consequence he now owns a right of way for another line connecting those two cities. It is said there is a desire on the part of the Southern lines for a line which is independent of the Vanderbilt interests, and as it is surmised that no part of either of the great Vanderbilt systems has been more profitable than the lines between Toledo and Detroit, other interests have viewed with envious eyes this fruitful field, and it seems as if, under the leadership of Mr. Burt, it will be invaded sooner than might be supposed. It is not expected that the road will be constructed until the outlook is a little more favorable in the financial world, but it is said it is sure to come. The new line, if built, it is understood will not be an Ann Arbor enterprise, and the Ann Arbor's terminals will doubtless be used.

Oklahoma.—A charter has been granted, so it is said, to the Gulf R. Co., to construct a road from Wakita, Okla., to Denison, Texas. Messrs. John A. Blair, of Caldwell, Kas.; R. L. Hall and L. B. Haven, of Medford, are among the directors.

Pennsylvania.—The enterprise known as the Butler & Pittsburgh road is an important one and no consideration is seemingly attached to obstacles which are nearly insurmountable. This road is being built by Mr. Andrew Carnegie and is in almost a straight line from Pittsburgh to the Allegheny river, hills and valleys having been wholly disregarded. The entire road is a succession of deep cutting, tremendous rocks, deep ravines and steep grades to be leveled. One cut, the Summit, is 3½ miles long, 55 ft. deep and has fills 85 ft. high. Over 162,000 yards of earth will have to be taken out. One and a half miles on this cut alone will cost \$100,000. The big fill at Davis Run is 85 ft. high and 270 ft. at the base. Over 1,500 yards of masonry have been used in the culvert already at a cost of \$20,000. Two contractors have the last 14 miles of the road, and both are rushing ahead. One firm has four miles of work of 175,000 cubic yards, and keeps 100 men employed. At the Butler end another firm has 10 miles with 200,000 yards of excavations. Over 500 men are at work and the piece is more than half done. The most scientific appliances for railway construction are being used on this work. Over 3,000 laborers in all are employed in the various departments of construction. The scenery along the route is very fine, but this will be of little consequence, as the road is expected to be used mainly for freight.

The contract for the extension of the Beech Creek road which is to be built in Cambria county, has been awarded to George S. Good & Co., of Lock Haven, Conn., and work will begin at once. The extension which will be about 9 miles in length, will run from Wigton colliery to Spangler, Mr. M. E. Olmstead, of Harrisburg, is president, and Mr. John B. McIntyre, of Jersey Shore, is engineer of the Beech Creek road.

A plan is being considered for the extension of the Stewartstown Railroad to Belair, Md. This road now extends from New Freedom to Stewartstown, a distance of 8½ miles, and the proposed extension will be about 25 miles in length, forming a connection at Belair with the York Southern. Then from Belair a new line will, it is said, be built to Magnolia station, on the Philadelphia, Wilmington & Baltimore Railroad, affording an entrance to Baltimore. Surveys have been made between Stewartstown and Belair, and it is said that money is available for the project. Mr. J. W. Anderson, of Stewartstown, Pa., is president of the Stewartstown Railroad, and Mr. W. F. Walworth, of Cleveland, Ohio, is president of the York Southern.

Wisconsin.—Articles of incorporation have been filed with the secretary of state at Madison, Wis., for the Sheboygan, St. Paul & Western R. Co. The road is to be constructed from Sheboygan to a point on the Milwaukee & Northern division of the Milwaukee at or near Random Lake, in Sheboygan county, and will be 18 miles long. The incorporators are Messrs. Frank Geel, Frank Roentz, Arthur F. Winter, James Mallman, and Paul Krez. Capital stock \$350,000.

INDUSTRIAL NOTES.

Cars and Locomotives.

—The Erie Railway Co. is reported to have placed an order for 1,000 cars with the Michigan Peninsular Co.

—Swift & Co. has contracted with the Wells French Co. for 100 refrigerator cars. They are also asking for bids on about 50 stock cars equipped with the Schoen pressed steel bolster.

—The number of cars contracted with the Michigan Peninsular Co., by the Chicago, Rock Island & Pacific Railway is 200 instead of 400 as previously stated. Schoen pressed steel bolsters are to be used on 150 of these cars.

Bridges.

—The Youngstown Bridge Company of Youngstown, O., is just completing a two span truss bridge for the Pennsylvania Lines, northwest, over the Tuscarawas river. It has contracts for several other bridges for the same company; three girder spans for shipment to Russia; furnace building for the new plant of the Punxatawney Iron Company; and among other structural work, several buildings for mining plants in Arizona. Work is also under way on the seven span bridge for Lewiston, Me., consisting of 85 ft. plate girders carrying granite pavement.

—The engineer of the water board of Hartford, Conn., has prepared estimates, etc., for an iron or steel bridge over Park river at Park street, to cost \$15,000 or for a stone structure to cost \$18,000. The question of construction will be decided in November.

—There is a movement on foot to erect a wagon bridge across the Trinity river near Ennis, Tex.

—Bids are asked until Oct. 16 for constructing a steel railway bridge, 600 ft. long, over the Androscoggin river at Rumford Falls, Me.

—The board of supervisors of Van Buren county, Ia., has voted in favor of granting an appropriation of \$20,000 with which to erect a new bridge spanning the Des Moines river between Douds and Leando.

—The county commissioners have been petitioned to erect a bridge over White river, about half a mile south of Richmond, Ind.

—The Milwaukee (Wis.) Bridge & Iron Company has been awarded the contract for building the Elgin, Joliet & Eastern Railway bridge over the drainage canal near Lockport, Ill., at its bid of \$93,477. The company has also received the contract for the Southwestern boulevard bridge, to cost \$15,200.

—Bids are asked until Oct. 17 for constructing a 60 ft., double brick arch over Touby's Run, Mansfield, O.

—The contract for a new bridge over Elk river at Elkton, Md., has been awarded to the Groton (N.Y.) Bridge Company for \$8,375. The question of adding a drawbridge was considered but as it would cost \$15,000 it was decided not to build one.

—The municipal authorities of Newport News, Va., will build one or more iron bridges if the election to vote bonds for the purpose which has been ordered results favorably.

Buildings.

—The Warrior Machine Works, Birmingham, Ala., will erect an addition to its plant, consisting of a machine shop 70x150 ft., to cost \$5,000, and equipped with machinery to be operated by electricity.

—It is reported that the Southern Railway Co. will erect a grain elevator in Brunswick, Ga.

—The Des Moines Leader says that contracts have been made whereby the C. R. I. & P. Ry. Co. will concentrate its Iowa business at Valley Junction, a suburb of Des Moines, Ia. New and large shops are to be built. Already some of the work on the improvements has been commenced and all the extensions are to be completed before July 1, 1897. The shops at Brooklyn and Stuart, it is announced, are to be abandoned and the work now done at these two places will be taken to Valley Junction.

—A large addition is to be erected to the plant of the American Machine Co. of Pawtucket, R. I. It will be 250 by 60 or 90 ft. This new addition will nearly double the size of the plant, and is necessary on account of the increase in the business.

—It is said that the Baltimore & Ohio Railroad Co. will establish woodworking shops at Keyser, W. Va., on condition that the city raise \$10,000 as a bonus.

—Post & McCord, Greenpoint, N. Y., manufacturers of finished steel for large buildings, have almost completed the erection of their new shops on the site of the building burned last July. The new building is 287x100 ft. The firm is said to have been so rushed with orders that work has been carried on in the open air and the new building has been erected around the workmen.

—The Northern Pacific roundhouse at West Superior, Wis., was burned last week. The company will rebuild with a fine modern structure.

Iron and Steel.

—The Totten & Hogg Iron and Steel Foundry Co., Pittsburgh, Pa., has recently received orders for iron and steel gear wheels and shafts for a company in Africa; also an order for a 36x40 engine for the Norton Iron Works, Ashland, Ky., and for machines for making spikes for the Tower Manufacturing Co., Madison, Ind.

—At a meeting of the Minnesota state capital commission October 6 the award of bids for structural iron and steel to be put in for the basement floor of the new building was made. The bidders were as follows: Crown Iron Works, Minneapolis, \$10,440; Gillette Herzog Mfg., \$8,483; S. T. Ferguson, Minneapolis, \$9,872; Olaf Hoff, Minneapolis, \$10,087; Universal Construction Co., Chicago, \$8,188; St. Paul Foundry Co., \$8,700; Milwaukee Bridge & Iron Co., \$9,134; Wisconsin Bridge & Iron Co., \$9,985; Sneed & Co. Iron Works, Louisville, \$10,240; Steward Iron Works, Cincinnati, \$12,440; L. Schreiber & Sons Co., Cincinnati, \$10,131. The contract was awarded to the Universal Construction Co., of Chicago, they being the lowest bidders.

—The Eleanor Iron Works, of Hollidaysburg, Pa., and the Tyrone Iron Works, of Tyrone, Pa., lighted their fires on September 29.

—President Blakistone, of the Central Ry. Co., of Baltimore, has awarded a contract to the Pennsylvania Steel Co., for about 2,000 tons of rails for the extension of its road in East Baltimore. The rails are of the nine inch grooved pattern and weigh eighty-six pounds to the yard, being equal to the ninety-five girder rail commonly used.

—The Boston Iron & Steel Co.'s plant, at McKeesport, has resumed with a full force, giving employment to about 500 men, after a three months' shut down.

—The contract for the erection of a large steel plant at Mariopol, Southeastern Russia is stated to have been secured by Miller Bros. & Co., of Pittsburgh, a well known firm of engineers and contractors. James C. Miller, a member of the firm, who will superintend the work is about to sail for Russia.

—The Atlantic Iron & Steel Co., at New Castle, has signed the Amalgamated Association scale and resumes in full this week. The plant employs about 700 men.

—The Duquesne Steel Works of the Carnegie Steel Co., located at Duquesne, Pa., after a shut down of two weeks, caused by a disastrous wreck to machinery, has resumed work, and employ almost 1,000 men that have been in enforced idleness.

—According to the Mobile Register, steel from Alabama iron can be made at a profit. The experiment has been tried several times and with results that have seemed encouraging, but the steel industry has not obtained that foot hold in the state that was predicted and so earnestly hoped for. There was no question but that when steel came to be made here cheaply a new industrial era would dawn for Alabama. We believe the time has at last arrived. The tests of the Hawkins process have been going on for some time in Birmingham, and have been noticed by us. Now, we are informed, the last doubt has been removed. Alabama iron will produce good steel. The Tradesman however states: "The new steel process being worked at Bessemer, Ala., has not made, so far, much figure in the newspapers. This fact makes one who knows something of such matters, the more hopeful of its final success. We confess to but slender faith in any new invention for making steel out of southern iron, very cheap. We have seen so many of these things fail after eating up big wads of money and wasting much valuable time that we have come to believe that while the established Bessemer and basic processes may be improved they cannot be superseded by any new invention. And we are the more fixed in this judgment because of the fact that all the alleged 'new processes' are essentially in principle identical with the ones we have had for many years in successful use. We are not looking for anything new on that line, any more than we are expecting that some second Edison will find a way of collecting the electric fluid without friction."

—Notice is given by the New Castle Engineering Works, New Castle, Pa., of the change of name of the James P. Witherow Company to the New Castle Engineering Works. This change is made in pursuance of request of stockholders composed of former creditors of James P. Witherow, who control and manage the operations of this company. All of the departments of the New Castle plant are in operation, and the company is in a position to give quick delivery on all work entering into blast furnace, steel plant and rolling mill construction, together with all kinds of general boiler, foundry and machine work; open hearth steel furnaces, gas producers and regenerative gas furnaces, blast furnaces and hot blast stoves, all kinds of tank and sheet iron work and chimneys and stacks of all descriptions.

—The Shoenberger Steel Co. of Pittsburgh has awarded contracts to the Ball Engine Co., Erie, Pa., and Siemens-Halske Electric Co., New York, for complete electric power plant, consisting of one 400 and one 150 horse power vertical compound engine, direct connected to 225 kilowatt and 100 kilowatt generators.

Machinery and Tools.

—The Niles Tool Works, Hamilton, O., has received a contract from the government to make eight 10 inch disappearing gun carriages for the coast defense. They are to be completed in sixteen months.

—The Edward P. Allis Co., Milwaukee, Wis., has received orders for two cross-compound vertical direct acting blowing engines for export to Austria. They are of the same pattern as those recently built for the Carnegie

works and are claimed to be the largest blowing engines ever built. They weigh about 275 tons each.

—The new wrecking crane No. 2 recently made by the Industrial Works, Bay City, Mich., for the New York, New Haven & Hartford road, had its first service near Canton, Mass., September 21, and Master Mechanic F. M. Twombly who has charge of it speaks in high terms of its efficiency. The wrecking train we may say was on the occasion gotten under way within five minutes after the order was received.

—Owing to the rapidly increasing demand for its self-opening and adjustable screw cutting die heads, the Geometric Drill Co., of New Haven, Conn., has found it necessary to appoint general sales agents at different points, who will carry a complete stock of the tools and can fill all orders promptly. Hill, Clarke & Co. of Boston have been appointed general agents for the New England states, and will hereafter be able to show samples of these die heads and to fill orders promptly from stock at their store, 146 Oliver street, Boston, Mass. The Company is also considering the appointment of other agents to cover the west, middle and southern states.

Miscellaneous.

—The Mossberg Manufacturing Co. has recently been reorganized with a capitalization of \$700,000. The new firm is called the Mossberg & Granville Manufacturing Co. The object of this change is for the purpose of largely increasing its manufacturing facilities. It is the intention to erect a factory large enough to accommodate 500 operators. The principal products will be a full line of rolling mills, punching and stamping machines. A special department will be fitted up for the manufacturing of the Mossberg roller bearings on a large scale.

—We are notified that Mr. Eugene Donnelly, formerly with the New Orleans office of the J. A. Fay & Egan Co., has been placed in charge of the Atlanta office of that firm. Mr. Charles A. Gilbert, formerly with the Atlanta office, is no longer connected with the company.

—A new iron manufacturing concern has been organized at St. Johns, N. B., for the manufacture of bar iron and bolts and nuts known as the St. John Rolling Mill & Bolt Works; capitalization, \$50,000.

—A dispatch from Washington states that the Bath Iron Works of Maine will build two of the 30-knot torpedo boats, and the Union Iron Works of San Francisco the remaining one. Wolff & Zwicker of Portland, Ore., will build the two 22 knot boats. Hereschoff will have three, the Columbia Iron Works of Baltimore, two. Hilman Bros. of Philadelphia, one. This is the decision finally reached by Chief Constructor Hichborn and Engineer in Chief Melville, to whom the numerous and complicated bids opened September 11, were referred. The policy pursued has been to obtain boats as large as possible under the proposals and to secure as many as the appropriation of \$1,800,000 would permit.

—The West Shore Railroad has placed a contract with the Harlan & Hollingsworth Co. of Wilmington, Del., for a steel hull ferryboat for use on the North river. The boat is to be 250 ft. long.

—The Blackmer & Post Pipe Co., St. Louis, Mo., states that Mr. B. H. Colby, sewer commissioner of St. Louis, has officially adopted its 27 and 30 in. double strength sewer pipe for use in place of 2x3 ft. brick sewers. It has also been awarded the contract for 3,700 ft. of 30 in. pipe for the sewerage system of Waterloo, Ia., and the contract for 1,075 ft. of 30 in. pipe for the city of Bluffton, Ia.

—The Montreal Construction Co. is the name of a company seeking incorporation at Montreal, Que., capital, \$500,000. The building of bridges and railways are the objects of the company.

—The United States Railway Equipment & Construction Co. of Cleveland, O., has been awarded the contract for constructing the Connellsville (Pa.) Street Railway Co.'s new line. It will be a single track overhead trolley system $2\frac{1}{2}$ miles in length, laid with 56 lb. steel rails.

—The Peerless Rubber Mfg. Company of New York has just added a 320 x 40 ft. extension to its works. This building is three stories high and doubles its capacity and is virtually a separate plant. Thus in case of fire in either plant, the work could still go on. The capacity of the Peerless plant is now \$2,000,000 worth of mechanical rubber goods per annum. It has in this new factory four 200 horse power water tube boilers and one 500 horse power Corliss engines. In the rubber machinery there are 4 mashers, 16 grinders and 4 calenders. There is also one of the largest belt presses in the world, 30 ft. long, 60 in. wide, with double plates and double stretchers. This is the only press of its kind in existence. There are in addition the necessary pumps, vulcanizers, etc., for the most complete and modern rubber factory in the world. New storehouses and other brick buildings have been added, making everything very complete. The business of this company under its efficient management has held its own wonderfully well through the bad times.

—Perley Putnam, general manager and the heaviest stockholder of the Laconia Car Co., of Laconia, N. H., has petitioned Judge Wallace of the supreme court for the appointment of a receiver for the corporation. The affairs of the concern are said to be in bad shape. The capital stock is about \$200,000; the plant is mortgaged for \$150,000 and has outstanding debts of \$250,000. The appointment of a receiver is asked that work may continue on contracts amounting to \$30,000. If a settlement is not then made with the creditors the concern will be put into insolvency. The car works are the largest single industry in Laconia, employing 600 men, with a weekly pay roll of over \$5000 when in full operation.